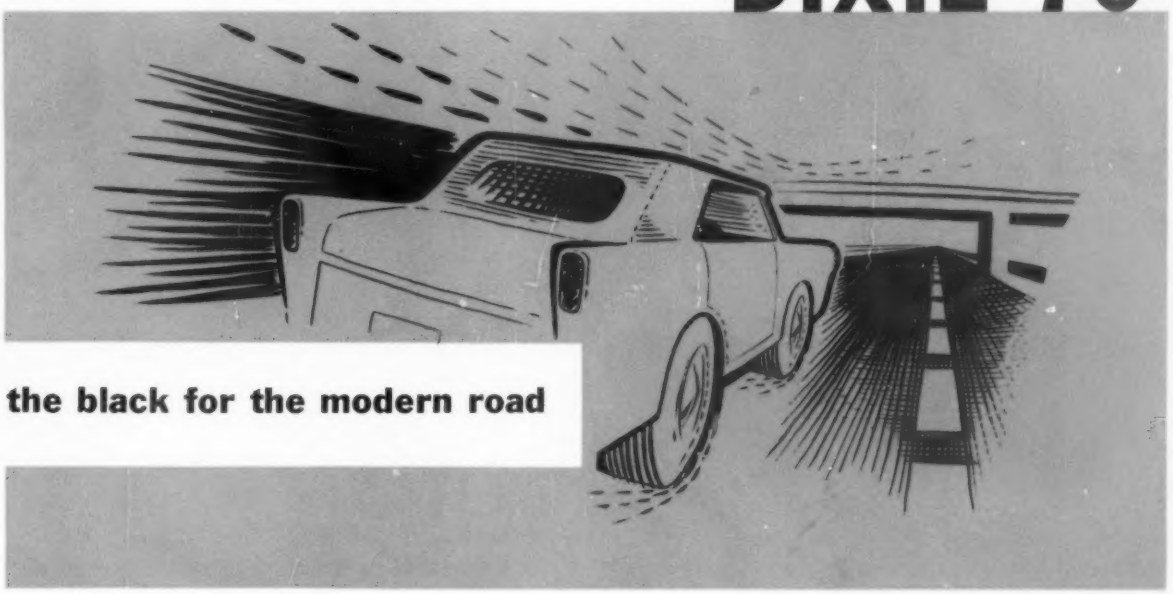
Rubber Journal and International Plastics

VOL. 139 NO. 24 DECEMBER 10 1960 Price 1s. Weekly

DIXIE 70



the black for the modern road

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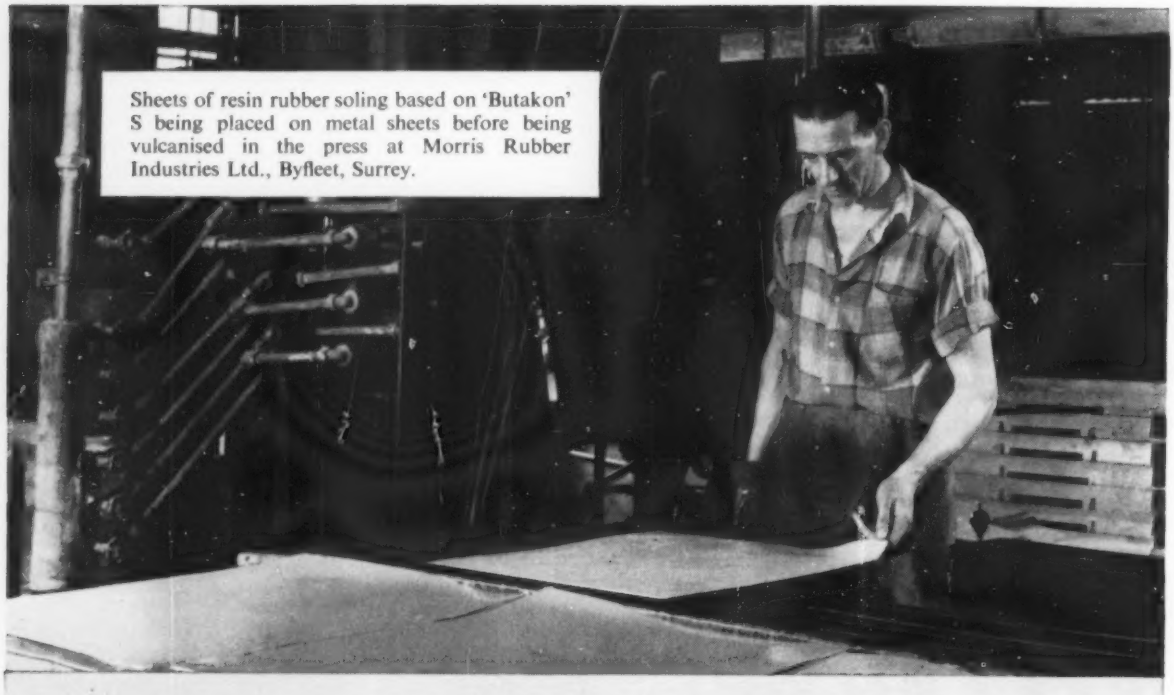


Sheets of resin rubber soling based on 'Butakon' S being placed on metal sheets before being vulcanised in the press at Morris Rubber Industries Ltd., Byfleet, Surrey.

Well-known shoe-soling manufacturers use 'Butakon' S to make harder wearing resin/rubber soles

Cutting pairs of 'Pennine' resin/rubber soles based on 'Butakon' S at Morris Rubber Industries Ltd., Byfleet, Surrey.

To make their 'Pennine' resin/rubber shoe soles light, flexible and, at the same time, waterproof and very hard wearing, Morris Rubber Industries Ltd., like many other leading manufacturers, use 'Butakon' S.

'Butakon' S is a butadiene/styrene co-polymer which disperses readily in both natural and synthetic rubber. Rubbers reinforced with it can be used to make sheets of soling material or complete moulded sole and heel units economically in any structure, solid, blown or semi-blown, and in a wide range of colours. These soling materials and units are in constant demand among both shoe manufacturers and repairers for footwear of all types.

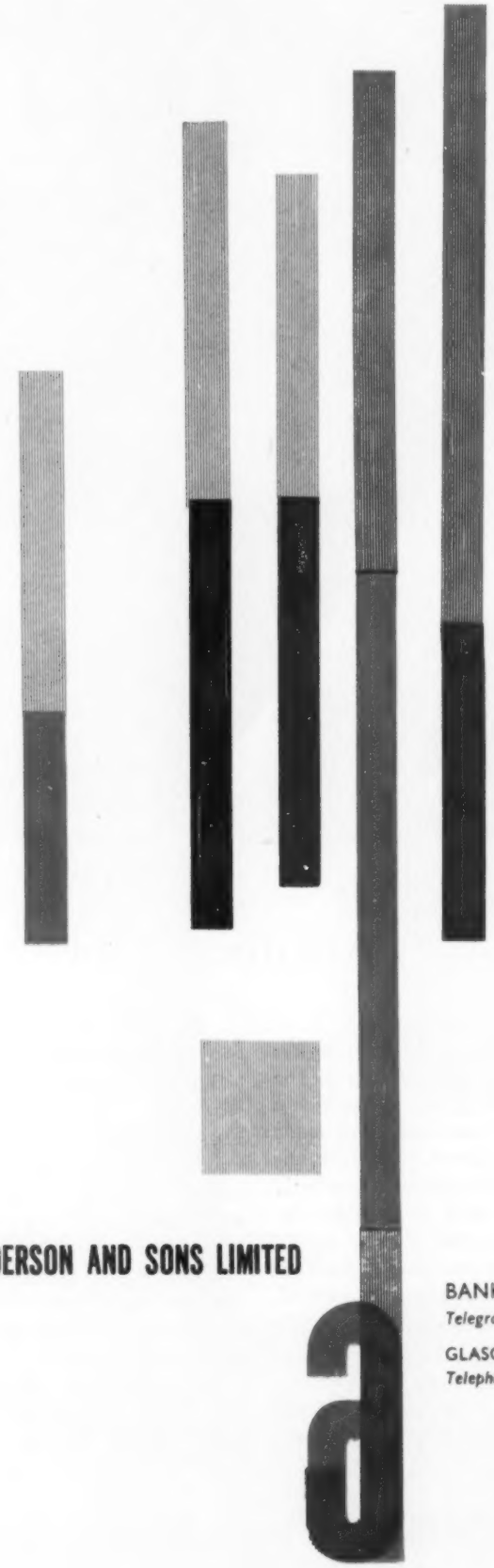
'Butakon'

'Butakon' is the registered trade mark for the range of butadiene co-polymers manufactured by I.C.I.

IMPERIAL CHEMICAL INDUSTRIES LIMITED · LONDON · S.W.1

ICI

P846



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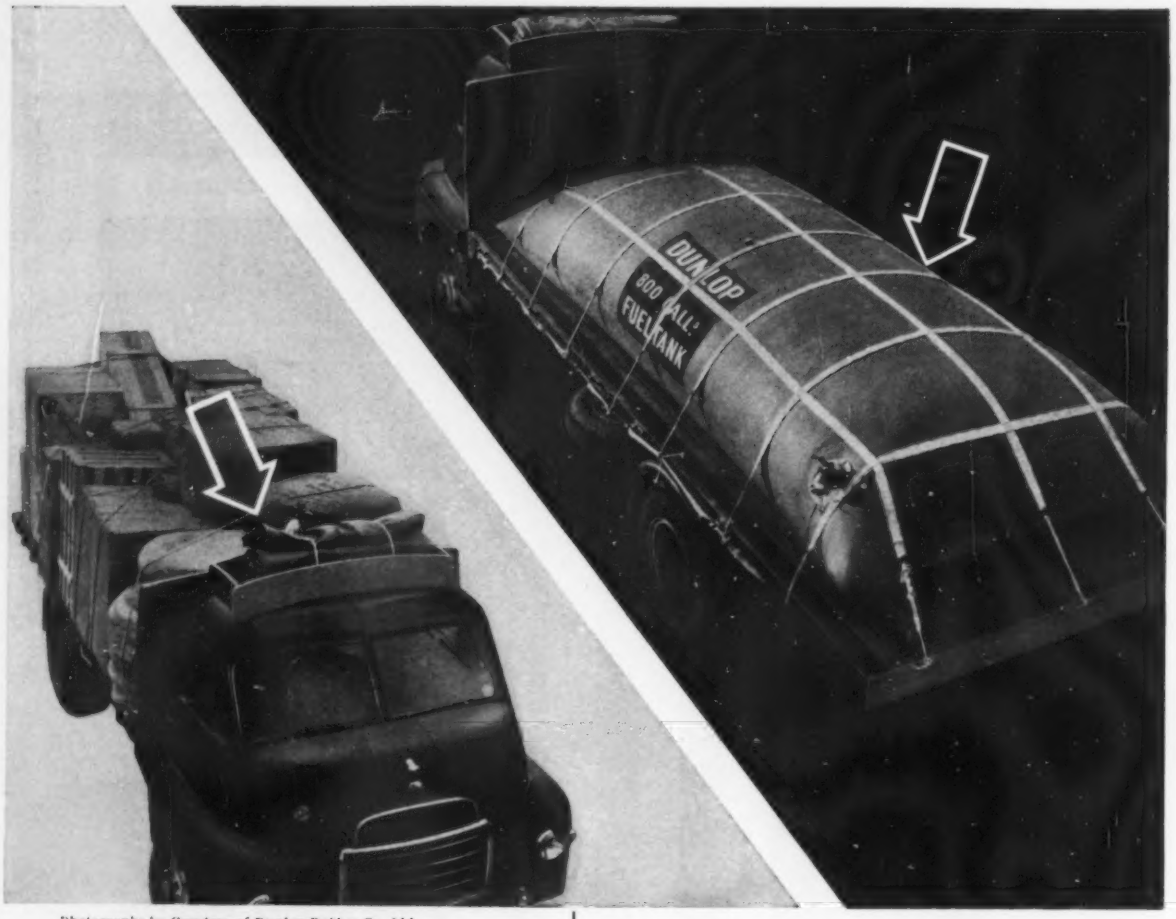

Photographs by Courtesy of Dunlop Rubber Co. Ltd.

A——B
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B——A
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Nylon-reinforced collapsible containers are revolutionising the transport and storage of liquids in bulk. These containers are made from nylon fabric coated on the outside with neoprene, a synthetic rubber resistant to weathering, and on the inside with a variety of natural or synthetic rubbers according to the liquid to be carried.

Containers of standard capacities of 250, 500, 800 and 1000 gallons can be folded easily when empty, occupying a very small space and may be carried above the cabin of a loaded lorry. Nylon is used as a base fabric because it is exceptionally strong, light in weight, and rot-proof.

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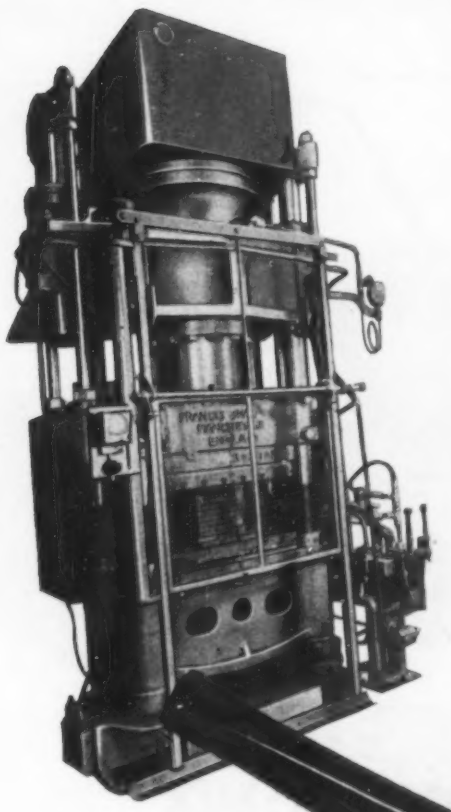
Constant research and development, close co-operation with users, advanced design, selected high quality materials . . . These, coupled with long experience, help to create processing machinery of unrivalled performance.



Francis Shaw hydraulic presses are tailor-made to requirements of the rubber and plastics industries. Illustrated is a 300-ton press recently installed. Shaw presses include the following design features:

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P4451

NEW development in the range of BEKEN Mixers

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The latest addition to the well known range of mixers is the Beken Duplex Extra Heavy Duty Mixer type 15D, which has been specially designed to mix and disperse the very tough and tenacious materials encountered in the Rubber, Plastics, Paint and allied industries.

Thorough dispersion, unvarying quality of output and constant mixing times are assured.

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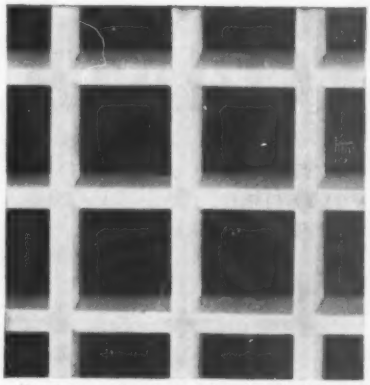
for heat resistance

special "thin-flash" type for grille moulding

Beetle D.M.C. is the material used for the grille of the Morphy-Richards Fan Heater because it offers high heat resistance and good appearance. The use of D.M.C. posed a flash-removal problem in relation to the many apertures, as the moulders, Crystalate (Mouldings) Ltd., specified a very thin flash line. Accordingly, B.I.P. Chemicals Ltd. developed a special type of material (D.M.C. L.1834) which, in combination with a tool made to close limits, ensures a consistently thin and easily removed flash.

Beetle D.M.C. combines heat resistance with strength, dimensional stability and excellent insulation properties. The development of a special type for a single application typifies the extent of B.I.P. services in relation to individual problems and requirements.



Heat resistance, dimensional stability, strength and electrical insulation properties are among the features making D.M.C. the ideal material for this grille. Moulding by Crystalate (Mouldings) Ltd., Tonbridge, Kent.

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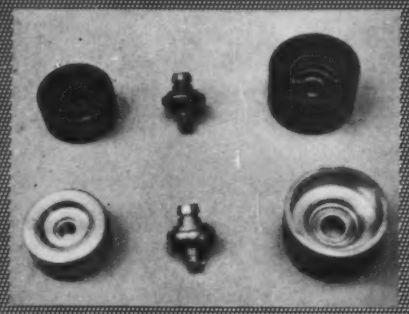
Polyester dough moulding Compound

B.I.P. Chemicals Limited, Oldbury, Birmingham. Phone BROadwell 2061
London Office: Haymarket House, 28 Haymarket, S.W.1. Phone TRAfalgar 3121



The VACU-BLAST DRY HONER

The rubber moulds illustrated have been cleaned in the VACU-BLAST Dry Honer;

the Dry Honer

* **preserves the mould contour – does not erode.**
* **is completely dry in operation – no solvents or liquids.**
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* **increases number of cures between cleaning operations.**
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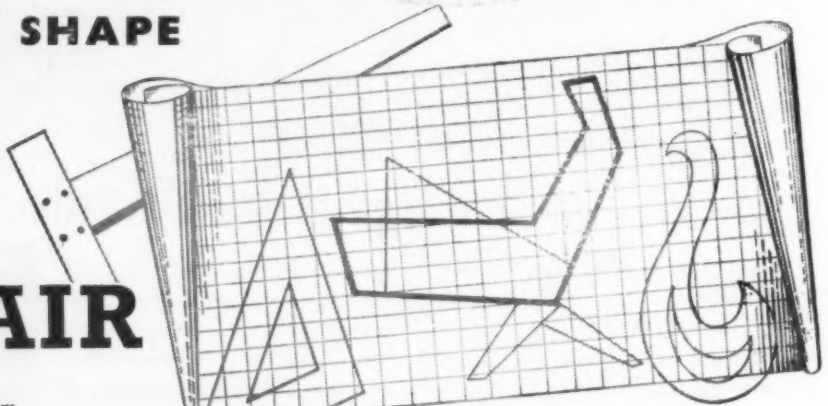
2 PAK

TO FIT THE SHAPE OF THINGS TO COME!!



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POLYETHER . . . *cushioning foam*
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PG 101

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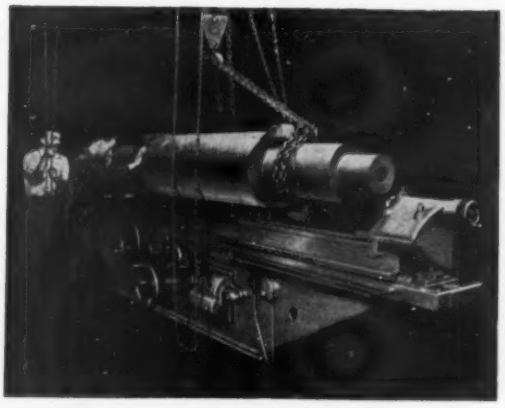

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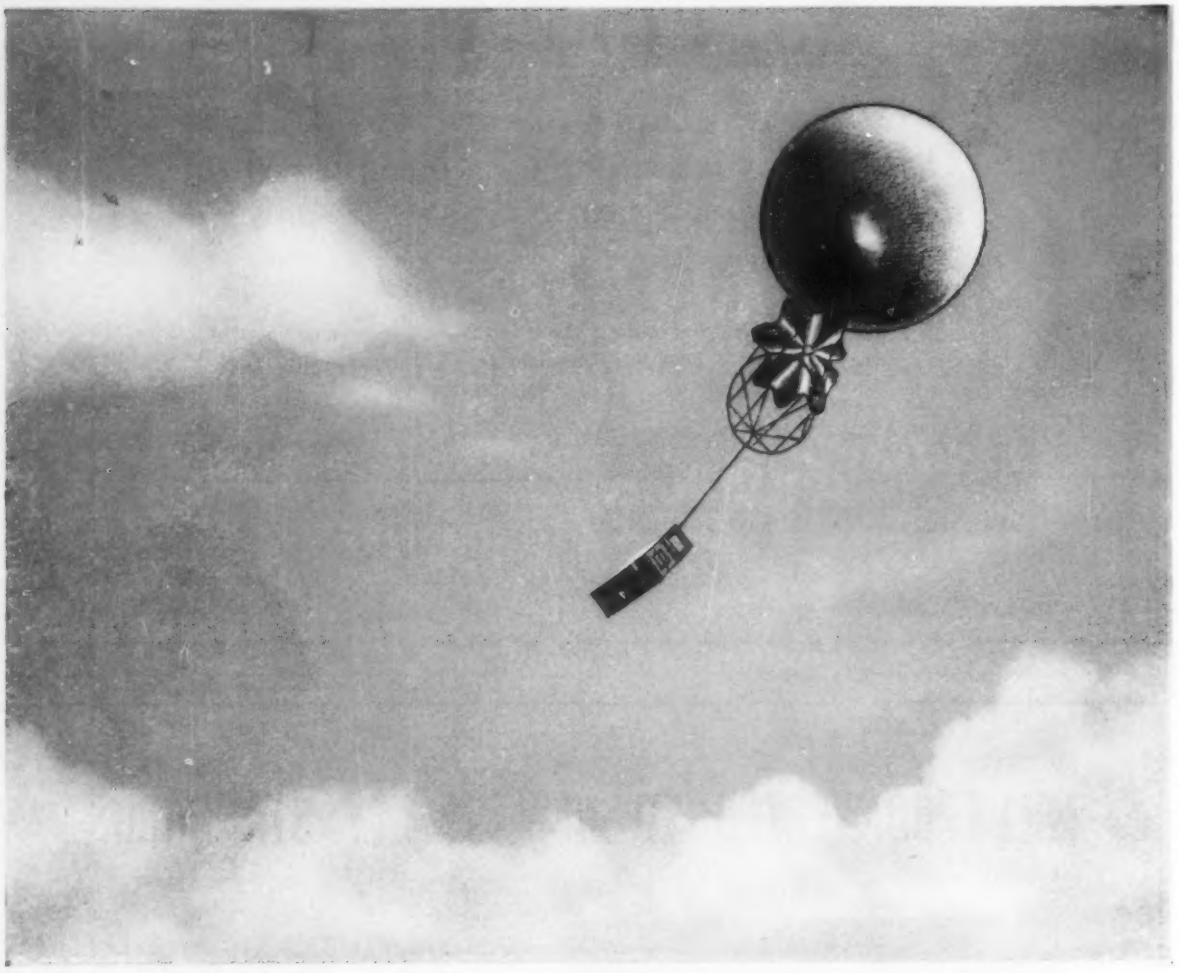

The Meteorological Balloon is but one of many products where ROBAC Latex Accelerators can be specified with complete confidence. Specify ROBAC Latex Accelerators for toy balloons, domestic, surgical and industrial rubber gloves, foam cushioning and upholstery, carpet backing and latex casting compositions for toys and advertising novelties.

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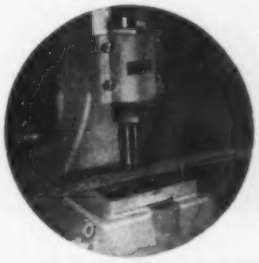
For trimming mouldings and cutting washers from sheet or strip.

Gaskets and Seals up to 7" x 5". For use with Cropping Tools etc. Very little floor space is required, making the Machine a valuable addition to any plant.

The Machine has been planned to take many different tooling arrangements for the Rubber Trade.



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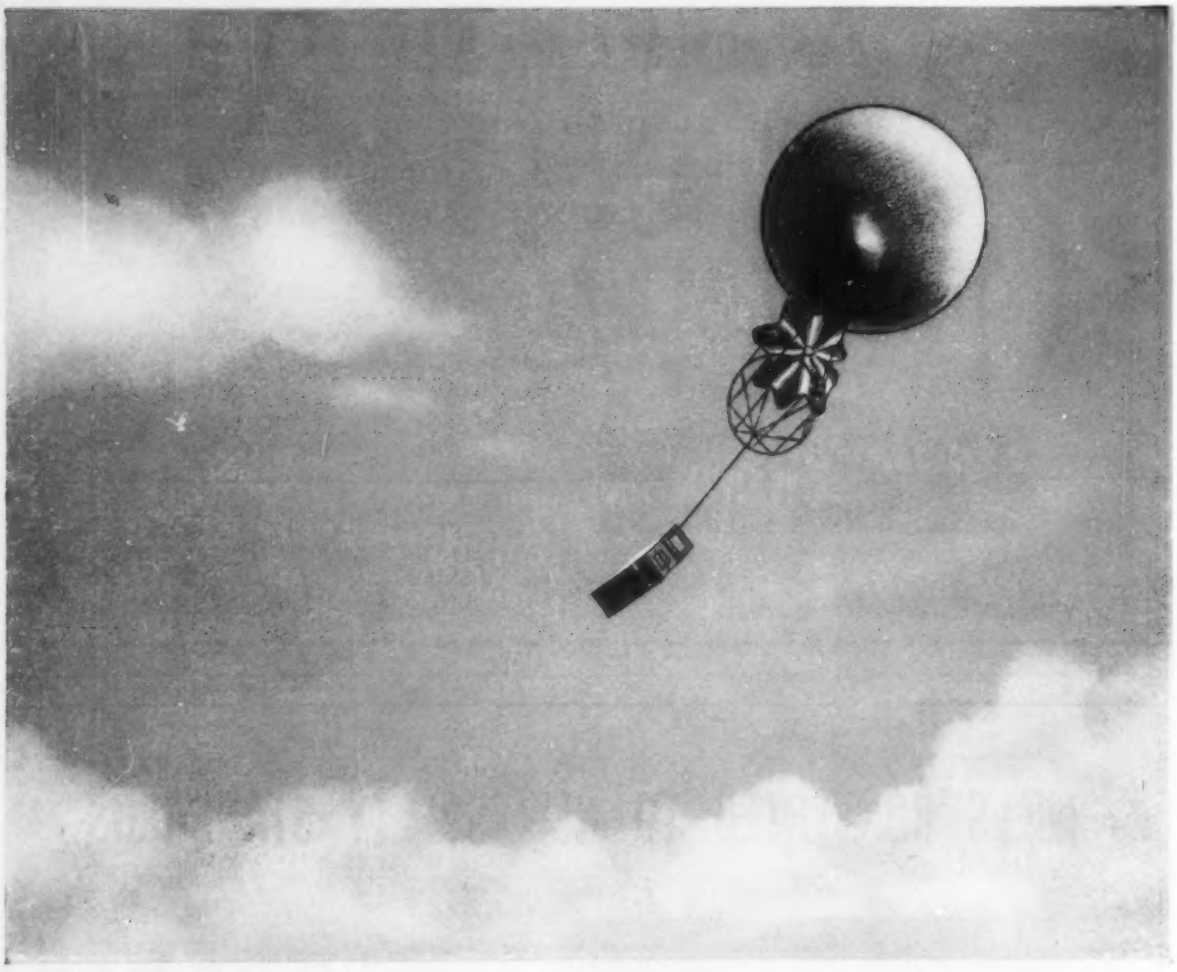

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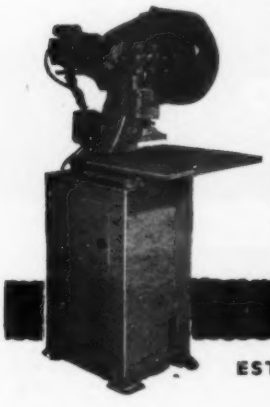

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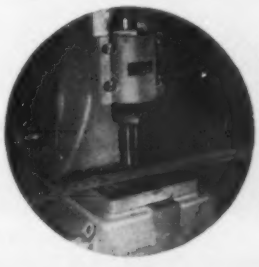

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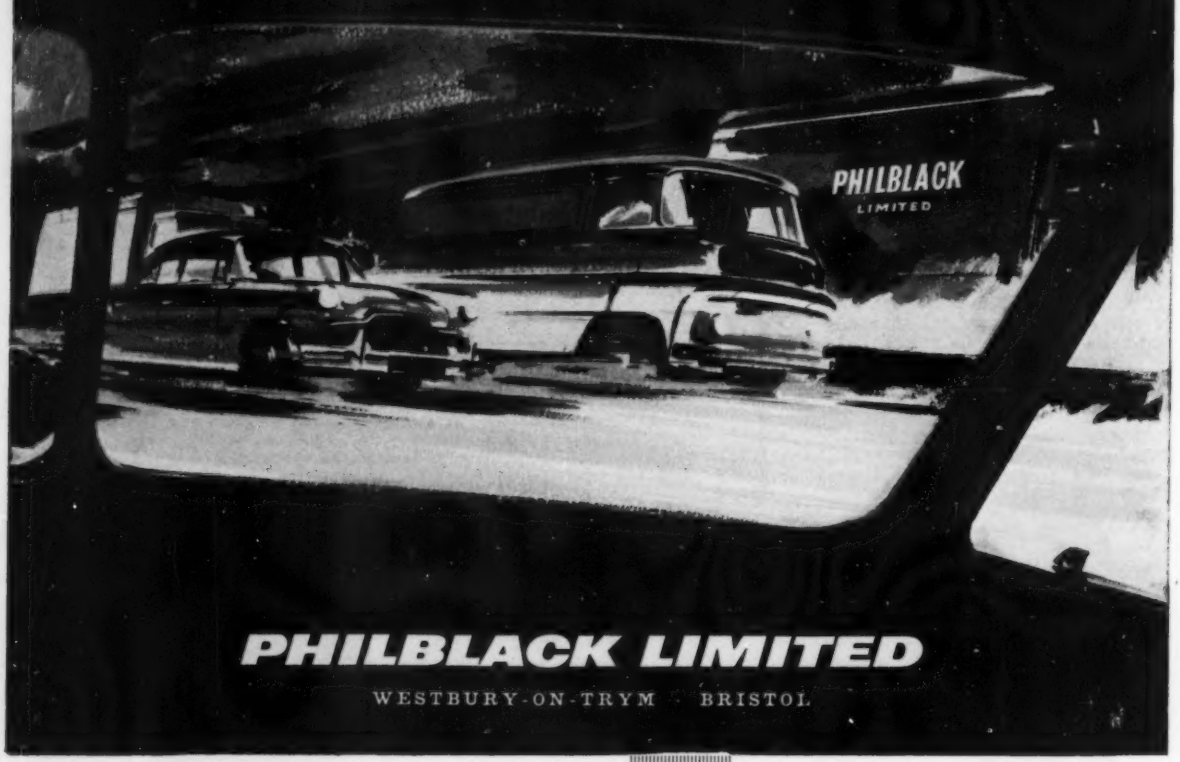

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TGA P8

NOTES of the WEEK

Combined Research Effort

THE recent publication of the report of the Structural Design Data Sub-Committee of the British Plastics Federation is the result of two years work collecting and collating data on the long-term properties of reinforced plastics. The hopes and objects of this committee were presented at the Reinforced Plastics Conference last week by B. T. Boswell, Ministry of Aviation, MEXE.

He suggested that the present research position is inefficient, extravagant and lacking in any cohesive purpose. It is quite true that, because of the lack of available information, the designer cannot, without initiating development test programmes—frequently duplicated by other companies—discover the answer to questions on the physical, mechanical and electrical properties which he must know in order to specify materials and structural details. The position could be greatly improved, without sacrificing immediate commercial benefits, by the acceptance of simple principles. These are that the industry should combine to develop essential fundamental research to be carried out by independent bodies, that the praiseworthy attempt by the BPF to define the extent and deficiencies in existing knowledge should be used to the maximum and that all research should be planned broadly on the lines defined by the Federation's questionnaire, or on some other agreed pattern. Eventually the pieces of the jig-saw would fit together instead of offering a jumble of unrelated shapes and sizes.

Only by such methods, and in an atmosphere of friendly co-operation and exchange of information, can a body of knowledge be accumulated which will enable reinforced plastics to be used with full confidence and efficiency.

Expanding Education

THE rapid expansion of the polymer industry has not been accompanied by such a rapid expansion in polymer education. At the seventh convocation of the National College of Rubber Technology (reported elsewhere in this issue), Herbert Rogers, chairman of the board of governors, said that for every technologist produced, industry wanted 10. The college, in common with other centres, is coping with as great a student load as it can possibly carry: 129 students (and a part-time load of 200) are being taught in accommodation originally intended for 90. All the more credit, then, to Dr Cotton and his staff for achieving such a high standard. The situation will be eased when the 1962/3 expansion programme gets under way —but this will also be a time when the bulge is well under way in the student age-group. In 1959 there were 570,000 school-leavers; next year there will be 90,000 more than this, and it is expected that the increase in 1962 will be 150,000. Unless we take advantage of the corresponding increase in potential technologists by increasing our educational facilities even more, industry's own expansion plans will be seriously affected.

But, nevertheless, the National College's programme, which will extend the present buildings to about four times their present size, is certainly a big step forward. Plastics technology courses are sure to play a large part in the programme, and this leads us to speculate whether there may be a new name as well as new buildings. As a sign of the rubber and plastics fields coming closer together, the Research Association of British Rubber Manufacturers has recently become the Rubber and Plastics Research Association. Before long we might see the NCRT become the NCPT—the National College of Polymer Technology.

Something in the Air

SCOTCH whisky is said to be made only where the burn water is of a certain softness. We have never thought that the air of North London had any kind of 'certain softness', but there must be something in it that is receptive to the development of polymers. At the National College convocation Herbert Rogers pointed out that Hancock established the first rubber factory in England in Goswell Road, Islington. Not far away, in Benwell Road (just behind the National College, in fact) one of the first companies making celluloid products was established a hundred years ago —the Holloway Collar Co. A little further east one of the pioneers of the plastics industry in this country, British Xylonite, set up their first 'plant' and laboratory in a few rooms in Homerton.

Perhaps it is one of those odd, unscientific coincidences. Or perhaps there really is something in the air. If there is, we are quite sure that that certain something has well and truly established itself in the National College.

NEWS *Briefs*

ORONITE IN JAPAN — ITALY SELLS RSS — MORE PLASTICS FROM GRACE — PIRELLI IN GREECE DOW STYRENE CONTRACT—NIGERIAN FACTORY

●**Italy** — Eighty tons of No. 1 RSS and 300 tons of No. 2 RSS from the Government stockpile have been put up for sale by public auction.

●**Japan** — Kao Manufacturing Co. plans to establish a new chemical company jointly with the Oronite Chemical Co. of USA. One of the products of the plant, which is expected to start production in 1962, will be alkyl phenol. Capacity for this will be 1,200 tons.

●**United States** — A major plastics expansion programme is planned by W. R. Grace for its polymer chemicals division. There will be a 50% increase in production facilities at the Baton Rouge, Louisiana, high density polythene plant. A complete range of polystyrene resins will also be manufactured, as well as the full span of low and medium density polythenes.

●**Indonesia** — The Soviet Union has bought 1,500 tons of blanket 'C' type rubber from Indonesia. The deal was concluded by a representative of the Moscow Razinimport enterprise.

●**Greece** — The firm of Pirelli-Hellas has been established in Athens, with Pirelli International as its majority stockholder and a Greek syndicate as the minority partner. The new company will build a $6m. plant, designed by the parent organization, with an annual output capacity of 240,000 tyres of all kinds, including farm tyres. This will meet 90% of the entire Greek demand.

●**United States** — Du Pont have reduced the prices of two types of mylar polyester film. The cuts put it in the $1.55 to $3.65 a lb. price bracket, compared with $1.80 to $3.90 previously.

●**Italy** — Pirelli have developed a new insulated cable — Butiltenax — designed as a substitute for bare conductors on insulators. The cable is insulated with butyl rubber and protected by a second coat of Sintenax, a PVC base resin mixture.

●**Canada** — Work is now in progress on laboratory extensions to the No. 1 Pilot Plant at Polymer Corporation, Sarnia. Included in the scheme is the revamping of the service facilities in the existing laboratory section. The overall cost of the project, which is connected with the development and control of the new solution-type polymers, will be about $100,000.

●**Ceylon** — Ceylonese and Chinese trade officials are holding talks on prices and quantities of next year's supply of Chinese rice to Ceylon under a barter pact. As soon as an agreement in principle is reached on the price of rice, a trade team from China will go to Colombo for discussions on the amount and price of the rubber which Ceylon will exchange for the rice.

●**United States** — United Carbon Co. has increased production capacity of black masterbatch by 50m. lb. A new masterbatch line has been introduced which claims to show increased tread wear ratings and faster processing.

●**Greece** — Dow Hellenic Chemical Industry Ltd. — a subsidiary of the US firm — have awarded final contracts for the completion of their polystyrene plant in Greece. The plant, located at Lavrion, near Athens, will be built by Foster Wheeler Italiana of Milan, Italy. Plastics technical service facilities are also included in the construction plans for the plant. Completion is scheduled for late November 1961.

●**Turkey** — Pirelli have begun the construction of their tyre factory near Izmir, in co-operation with Turkish interests. The proposed plant will have a capacity of 120,000 tyres and 250,000 covers and tubes a year. The company has a nominal capital of £T45m.

●**Western Nigeria** — Construction of a new £139,000 rubber processing factory by the Western Nigerian Development Corporation will begin early next January. It will be sited at the Araromi rubber estate and will make sheet rubber, lumps and crepe from latex produced at the plantation. Tapping will begin early in April next year on 423 of the plantation's 8,000 acres. An average yield of 1,200lb. per acre a year is expected from the budded clones planted on the estate.

●**United States** — Humble are to raise p-xylene capacity at Baytown from 65 to 105m. lb. a year. Extensions are expected to be completed in 1962.

'Well, at least nobody can say we never tried to reduce the cure by putting the steam pressure up'— 514

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Soviet Know-how for I.C.I.?

NEGOTIATIONS FOR CAPROLACTAM LICENCE

AT a Press conference during his Moscow visit, S. P. Chambers, the I.C.I. Chairman, announced that his company was starting negotiations for its first purchase of a Soviet licence. This would be for the manufacture of caprolactam, which is the monomer for nylon 6. Russia is said to have a cheap process for making this material.

I.C.I. have announced a £10m. project through its Dyestuffs Division for the production of nylon 6. This is expected to have a capacity of 15,000 tons, but no other details have been released.

Mr Chambers added that British technical experts were exploring the possibilities of buying Soviet licences for other technological processes — in fact, he indicated, in a few years Britain may be buying more USSR licences than Russia bought from the UK.

Polythene Plant

Negotiations for I.C.I. to sell a polythene plant to Russia are also said to be well under way; representatives of Simon-Carves, who would erect the plant in co-operation with I.C.I., are now in Moscow.

Mr Chambers is reported to have said that he was optimistic about business prospects with Russia, and that he believed that his company's exports could be 'doubled or quadrupled within the next two years.' As previously reported (*RJIP* Dec. 3 924) I.C.I. exported £2m. worth of chemicals to Russia last year, mainly dyestuffs and plastics. This year's figure is likely to be closer to £3m. According to the Society news agency *Tass*, Mr Chambers is in favour of full freedom of trade and would like to see the lifting of all restrictions on the sale of some chemical products on the list of strategic goods.

I.C.I. have been negotiating for some time with a consortium of East European countries — Poland, East Germany, Czechoslovakia and Rumania — over the sale of its polythene know-how. The company produces 105,000 *tons of polythene in the UK and also produces through subsidiaries in Canada, India and Australia. In Western Europe it owns half of Danbritkem A/S, a company which is building a* 15,000 *ton polythene plant in Denmark.*

Polyurethane Increases Milk Yield

One of the most novel exhibits that drew a lot of comment at the Smithfield Show this week was a polyurethane mattress for cows. Made by the Gourock Ropework Co. Ltd., of Port Glasgow, and called a 'Kowlay,' the mattress consists of a foam interior with a cover of PVC-coated nylon.

The nylon fabric is made by Gourock and coated by them; the seams are welded by high frequency welding equipment supplied by the Wokingham firm Radio Heaters Ltd.

The Kowlay (cost: £12 15s.) replaces expensive bedding straw and is expected to pay for itself in a year. Cleaning is simplified, because it can be hosed down, and it is even said that cows bedded on the mattresses show a higher yield of milk.

Cable Factory Flooded

Flooding caused a complete stoppage at the Derby factory of Derby Cables Ltd., a member of the Crompton Parkinson group. About 400 men were sent home on Monday, but returned later to carry out what a spokesman described to *RJIP* as 'literally mopping up operations.' The factory was expected to be back to normal on Thursday (December 8), and no estimate of the damage has yet been made.

BTR stated that their nearby Burton plant was unaffected.

'High and Dry'

Out of all the Dunlop plants the ones threatened most by the floods were the two in South Wales, but these were said to be 'high and dry.'

No flooding was reported at I.C.I.'s Severnside project, but building operations were being hampered by rain.

Carter's Programme

A considerable expansion programme is being carried out by B. and F. Carter and Co., the Bolton firm who produce braiding, cable and hose making machines. The latest project consists of three new 150ft. x 40ft. bays, equipped with overhead cranes.

Work has begun on the first bay, in which jobs will be carried out on steel fabrication and construction.

More Du Pont Moves in Europe?

Du Pont's treasurer, Russel Pippin, said in Wilmington, USA, that in 1961 a lot of stress would again be laid on projects outside USA. 'I would not be surprised if we announce one or two more for Europe within the next year,' he declared.

Mr Pippin also disclosed that Du Pont was negotiating for another joint operation with a Japanese company, but withheld details. Recently, as reported in *RJIP*, Du Pont concluded a joint venture for production of neoprene in Japan.

Outlook for Du Pont: page 989

MB Expand

Metal Box have bought 15 acres of land on the Wirral peninsula for a new flexible packaging factory.

The company says that the industrial development certificate has been received from the Board of Trade and outline planning permission has already been given.

When the building is completed, the plastics group's lamination production facilities now at Speke will be moved to the new factory. In addition room will be provided for the expansion of its activities in the printing and conversion of flexible packaging materials.

It is estimated that when fully equipped the cost of the factory will be in the region of £1m. and it will probably employ 500 people.

LTE'S New Lab

London Transport's new research laboratory at Chiswick was officially opened on Monday. Rubber and plastics are among the materials regularly tested by the organization to see that they comply with specifications, and the new building contains a department for the physical testing of non-metallic materials. Included in the equipment is a rubber hardness tester and a plastics impact tester. There are also facilities for accelerated exposure testing.

London Transport says that much attention is also given to keeping abreast of the latest technical developments in all types of materials and processes, and adds that work is always in hand with new developments in such fields as plastics.

Another Precision Product made from S.P. Rubber

SP stands for "superior processing": it also means speed and precision in extruding, calendering and moulding. What more do you want? Well, of course, you want PA 80 RUBBER, the latest and most versatile addition to the SP Rubber family from Malaya. PA 80 gives you all the SP benefits in an even more convenient form.

Blend in 1 : 3 ratio with any grade of natural or butadiene-styrene general purpose synthetic rubber to give it excellent SP properties. Use PA 80 in higher ratios for those special jobs.

(Left: section of extrusion magnified)

. . . gasket for spin drier extruded from SP rubber. Manufacturers: P. B. Cow & Co. Ltd.

SP rubber is obtainable in No. 1 qualities as SP RSS, SP crepe, SP air-dried sheet, and in the off grades as SP brown crepe.

SP rubbers and PA 80 rubber are produced on far eastern estates under licence from the Rubber Research Institute of Malaya. PA 80 is marketed in the form of 100-lb blocks wrapped in polythene and packed in multiwall paper bags for ease of handling and good stacking in warehouse and factory.

For further information on SP rubber and PA 80 write to: The Natural Rubber Producers' Research Association, 56 Tewin Road, Welwyn Garden City, Hertfordshire, England.

Issued by The Natural Rubber Bureau

Reinforced Plastics Progress

SECOND INTERNATIONAL CONFERENCE IN LONDON

THAT reinforced plastics occupy an important place in the plastics industry as a whole is evident from the fact that some 640 delegates attended the Second International Reinforced Plastics Conference organized by the Reinforced Plastics Group of the British Plastics Federation and held at the Café Royal from November 29 to December 2. Of these almost 100 came from 17 overseas countries including a party from Russia and Czechoslovakia which outnumbered those from the USA.

David Radford, chairman of the British Plastics Federation, speaking at the conference lunch, remarked that this was a unique international audience and that the conference was believed to be the largest of its kind ever held in Europe, which emphasized the growing importance of this branch of the industry. This opinion was also endorsed by P. Robert Young, a member of the Reinforced Plastics Committee of the American SPI, who said that the attendance at similar conferences in the USA was also large compared to other plastics conferences; an indication of a sound future for the industry.

Mr Young also remarked that it seemed to him that the opinion generally held in this country was that America was ahead of us in the reinforced plastics field was not true. Their industry, he said, was admittedly much larger but as far as he could see from visits he had made in England, techniques varied very little. He also mentioned that there was to be an exhibition and conference in Chicago on February 7, 8 and 9 1961, which he hoped many of those present at this conference would be able to attend.

Lively Discussions

Preprints of the 29 papers were distributed to all delegates before the conference and the authors were restricted to only brief summaries of the more important aspects of their papers and ample time was allowed for discussion.

Although this procedure is perhaps the best possible, it nearly came to grief because of the rather late distribution of the preprints. Despite this, however, it was clear that a high proportion of the delegates had read the printed versions of the papers beforehand and as a result the discussions were without exception very lively, many interesting points were raised and most delegates must have returned to their homes with much food for thought.

Production Practice

The first day of the conference was devoted to papers under the general heading of production practice and a discussion was held after every two or three papers.

C. C. Smith and N. W. Sutton, Mendip (Chemical Engineering) Ltd., described the method of manufacture and use of open lay-up moulds made from metal, wood, plaster, reinforced resin and fusible materials. The advantages and disadvantages of each material were discussed and factors governing the choice of material for a particular application were indicated. This was followed by a paper by A. J. Bellworthy, C. F. Taylor (Plastics) Ltd., in which the need for proper training of operators was discussed, a knowledge and experience of a range of techniques and materials, basic engineering practice and ability to read a drawing being considered essential.

In the discussion which followed several opinions were voiced on the length of time necessary to train an operator, and it was generally agreed that this varied very considerably with the aptitude of the man, some quickly becoming proficient while for others the necessary skills seemed to be unattainable.

Female labour for this type of work

Long Term Properties

JUST over two years ago, Fibreglass Ltd. canvassed many firms and establishments stressing the need to collect and collate data on the long term weathering and mechanical properties of reinforced plastics.

This culminated in the formation of the Structural Design Data Sub-Committee of the British Plastics Federation's Reinforced Plastics Group. The instructions of this sub-committee were to (a) review existing literature, (b) collect all possible data regarding unpublished, current or projected work, and (c) indicate the gaps in the present knowledge.

BPF Questionnaire

The hard work which has been done in those two years has recently culminated in the publishing of a comprehensive 68-page report covering the first two heads, and work is in hand on the third.

A questionnaire was widely circulated by the BPF to obtain details of work previously unpublished or currently in hand. Because of the extremely poor response to this the report is devoted mainly to evaluation of published work.

The report is divided into two main sections dealing respectively with published and unpublished work and each of these sections is divided into three parts concerned with weathering, fatigue, and creep and stress rupture. In general the information available was mainly on the behaviour of polyester/glass cloth laminates on which much useful data existed, while the data in the case of glass mat and other types of reinforcement, or of epoxy, phenolic and silicone resins were much more limited.

In the case of weathering there were many gaps in the available knowledge such as the effects of resin content, gel coats and organic fibre overlays. The many variables in manufacture had a largely unknown effect on the finished product and the cause of degradation and the establishment of truly representative accelerated tests were matters requiring urgent attention.

On the subject of fatigue much remained to be done to provide even a general picture and the work which had been done on stress rupture and creep was in many cases limited in value because it had not been statistically designed or adequately reported and because the periods of test had been short.

This presents a rather gloomy picture of the present state of affairs but without any doubt the work of the sub-committee is only just beginning and anything which can be done to introduce some guidance and reduce the appalling waste of effort that has gone on in the past must eventually pay dividends.

CO-OPERATIVE RESEARCH

Times were when scientists pursued their urgent but sometimes vague enthusiasms in a sort of ivory tower detachment. In many cases they were either unaware of or cared nothing for the needs and aims of industry. Those days are long since gone. Research in most fields now is a two-way business.

Thus in the field of rubber antioxidants, research is based on co-operation between organic and physical chemists and the rubber technologists. Years of experience have built up a background of information on the influence of chemical structure on technical efficiency, and the correlation between chemical activity and technical effect.

The build-up of knowledge over some 30 years has in this way been a live and progressive process, combining the tools of organic preparative, analytical, and technological science and enabling I.C.I. to offer currently to the rubber industry a range of non-staining antioxidants of exceptional variety.

Adequate definition of the target in mind is followed by selection of the particular field of chemistry. Certain sorting tests can be carried out by the organic and physical chemists, the more likely candidates among the compounds prepared being subjected to technological evaluation.

Before a new antioxidant is launched a thorough evaluation is carried out. In the preliminary stages a limited number of test-compounds are submitted to conventional ageing tests in the oxygen bomb and the air oven. For this purpose I.C.I. maintain a unit comprising four large oxygen bombs held at 70°C and a smaller oxygen bomb unit which can be operated under various conditions as required. Air oven ageing is carried out in fluid-heated individual container units in order to avoid cross-contamination and to ensure constant temperature. Staining tendencies are evaluated by exposure of rubber to a u.v. light source or to sunlight, the degree of discoloration being measured by means of a reflectance spectrophotometer. A Xenon-lamp unit has been recently installed and is expected to replace the u.v. lamps as a source of illumination.

There follow then more detailed evaluations on different rubber compounds based on natural and synthetic rubbers. The range of tests is extended to include high-temperature air oven ageing and flex-cracking. Special applications involve the measurement of properties such as compression set, extractability, and migration. Conventional ageing tests are supplemented by measurements of oxygen absorption and stress relaxation.

Hundreds of chemicals are subjected to preliminary sorting tests but of these only a few undergo detailed evaluation. This is not because the many show no merit but because they lack the particular qualities that are being sought. The final result is a range of non-staining anti-oxidants which offer a product for almost every application. New products will be added to the range and older products will gradually be replaced as they become out-moded.

Co-operative research continues.

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was also considered to be generally satisfactory except that in many cases operators tended to marry or drift to other employment and were therefore not worth training for the more skilled procedures.

David Radford, Chairman of the British Plastics Federation addressing delegates to the Second International Reinforced Plastics Conference. Also in the picture are (*left to right*) **C. J. G. Stanley (Gen. Manager, British Plastics Federation), S. R. Badley (British Resin Products, Ltd.), P. Robert Young (Wallace and Tiernan, Inc.), H. V. Blake (Glass Yarns and Deeside Fabrics, Ltd.), and Dr S. Goldfein (US Army ERDL)**

The next three papers were devoted to other methods of production using resin - glass deposition equipment, matched metal tooling and winding techniques. K. M. Grisley, Tepco Reinforced Plastics Co., discussed the advantages and difficulties of using resin/glass spraying apparatus and the various methods of approaching the problem; T. P. R. Lant, De Havilland Aircraft Co. Ltd., dealt with the moulding of epoxy/glass and phenolic/asbestos systems in matched metal tools and discussed the problem of obtaining accurate, reproducible high pressure mouldings using asbestos felts alone, felt/flock combinations and flock alone; A. W. Wilson, Bristol Aerojets Ltd., discussed the practical and economic aspects of wound reinforced plastic structures and then showed a film of the production of these structures by Bristol Aeroplane Plastics Ltd.

Thunderbird Radome

C. Joseph, Fibreglass Ltd., illustrated the hand lay-up, semi-mechanical and continuous production methods for the manufacture of translucent sheeting with diagrams, discussed the importance of the choice of the correct raw materials and put forward suggestions for the improvement of weathering and light transmission properties. A film made by Bakelite Ltd., showing the production of radomes for the English Electric Thunderbird was shown and in the discussion following this group of lectures and films several interesting points were raised including the following.

The Thunderbird radome is made using a knitted glass fabric shape and the overall economics of flat cloth, shaped cloth, knitted shape or winding techniques were discussed. In the case of the missile, economics are not the governing factor but the electrical properties are of paramount importance. The knitted shape is economic, is not of very high strength, but has good electrical characteristics. The question of loss of light transmission of translucent sheet on ageing caused a great deal of discussion and methods of protection suggested included the inclusion of colouring matter or UV absorbers, the use of a methacrylate instead of styrene in the resin and the provision of a resin rich surface on the laminate.

Cost Calculations

The final paper on the first day was given by J. E. Linsell, Microcell Ltd., and the title was 'When do I Mechanize?' He had gone to great lengths to produce figures to show the cost of producing various numbers of several different mouldings using different production techniques setting off the tool costs and labour costs and other variables. The conclusion reached was that if production was greater than 2,500 the hand lay-up technique was no cheaper than more mechanized methods using matched tooling. A very lively discussion followed this paper and

Parkyn's Crystal Ball

PROSPECTS FOR THE FUTURE

THE conference was brought to a fitting end with an excellent lecture by Brian Parkyn of Scott Bader and Co. Ltd. He was one of the first men in England to get into reinforced plastics, said the chairman, and deserved the title of 'Father of the Industry.' Heavily bearded and somewhat prophetic in appearance, Mr Parkyn certainly produced a fascinating glimpse of the future as seen through his (reinforced plastic) crystal ball.

Reinforced plastics, he said, were growing rapidly throughout the world, production of polyester resins in this country had increased from 4,700 tons in 1958 to 6,700 tons in 1959, and this represented a production of reinforced plastics of about 10,000 tons. He forecast that the potential market was between 40,000 and 60,000 tons a year which would be realized in a wide variety of applications. He looked forward to the time when upwards of 15% of all commercial vehicles would have glass fibre reinforced cabs, wings and bodies, 10% of the factory roofs would be corrugated plastic and when every motor cycle and scooter would be using about 6lb. of it, not to mention all the other applications in boats, cars, railways and aircraft.

This progress would not be made without some losses to the newer thermoplastics which were being developed and which would undoubtedly take some of the markets at present held by reinforced plastics. This, he said, was because the methods of production of laminates posed problems of quality control not encountered elsewhere which might not be satisfactorily resolved for some years and in many cases production rates which could be achieved with thermoplastics would preclude the use of other materials.

Many people who a few years ago were saying that there was no future for an industry based on the 'bucket and brush' technique, were now claiming that reinforced plastics would soon be rivals of many conventional materials including even steel. The truth obviously lay somewhere between these two extremes.

opinions were mixed on the validity of some of Mr Linsell's calculations. In particular the cost of tools can vary a great deal depending on complexity, quality, and on the manufacturer. (A case was cited where quotes for a tool had varied from £500 to £3,800 from different tool makers.) The fact which seemed to emerge was that to generalize was almost impossible and each individual job must be considered on its own merits, taking into account as many of the numerous variables as possible.

During the second day two concurrent sessions were held which were on recent advances in materials, processes and design and on engineering in reinforced plastics.

Reports on these papers will appear in a latter issue of *RJIP*.

Goodrich Plans for Far East

BACK from a 35,000 mile trip through the Far East, J. W. Keener, president of B. F. Goodrich, predicted that the increasing use of cars would spur the industrial development of that part of the world in the next few years.

Mr Keener cited Australia, Japan and the Philippines as countries that were just beginning to develop 'automotive economies.' B. F. Goodrich was preparing to meet rapidly increasing demands for tyres and other rubber and plastic products in these countries, he said.

'Our new tyre plant at Melbourne, Australia, will be in full capacity by January 1961, and our new Geon plant in the same city should begin production in February,' he added.

In Japan, Goodrich's associate, the Yokohama Rubber Company was the second largest rubber company and B. F. Goodrich also had interest in two Geon plants and a synthetic rubber plant owned and operated by the Japanese Geon Company.

In the Philippines, BFG's associate tyre plant, in its fourth year of production was doing well, Mr Keener went on. The Philippine associate company had 2,500 acres of rubber plantations and another 2,500 acres under management of the International B. F. Goodrich Company.

Cowan Taken Over

Cowan Bros. (Stratford) Ltd. have joined the Johnson Matthey group of companies.

The company — which specializes in the production of inorganic colours, pigment dyestuffs and lakes for the polymer and other industries — will continue manufacturing and trading as before and there will be no staff changes.

Sir Christopher Cowan is remaining as chairman and managing director, together with the present directors, and the board has been increased by the addition of two representatives from Johnson Matthey.

Sealant Conference Formed

A Sealant Manufacturers' Conference has been formed within the Federation of British Rubber and Allied Manufacturers.

Its first step will be to work out performance standards for rubber-based sealing compounds, and a code of practice for their application in the building, ship-building and other industries.

Officers for 1960-61 are: D. E. Cameron (B. B. Chemical, chairman) and Dr W. Rubin (Kelsey Industries, vice-chairman). Foundation members of the conference are: B. B. Chemical Co. Ltd., British Paints Ltd., Evomastics Ltd., Expandite Ltd., T. and W. Farmiloe Ltd., Kelseal Ltd., and Minnesota Mining and Manufacturing Co. Ltd.

The 300 employees at the Goodyear Tyre factory at Garscadden, Glasgow, who have been on strike over the suspension of two men, returned to work on Tuesday to allow negotiations to begin.

New Hairlok Material

Texlite, a pack-cushioning material of crimped rubberized hair just developed by Hairlok Ltd. is made by a new production technique. Curled hair bonded with latex is carded into a delicate uniform layer of light density, gently gathered by a system of needles and condensed. The original curl of the hair is preserved and a crimped structure is developed through the needling action which is said to give Texlite exceptional resilience and resistance to stratification.

Hairlok claim that better protection is afforded by 1lb. of Texlite than by 2lb. of ordinary rubberized hair. Applications include that of cushioning material for packing electronic and other delicate instruments.

Mass production of the material will start in January 1961. The standard densities are 4lb. and 6lb. per cu. ft., in thicknesses of 1in., 1½in. and 2in., but other densities can also be obtained. It is manufactured in sheet form, but it can be fabricated to individual requirements.

Floating Fair

Preparations have started in Djakarta to send an Indonesian floating trade fair, featuring produce including rubber, housed on a 7,000-ton motor vessel, on a voyage to countries in the Western Pacific area to promote trade relations and acquainting other nations with Indonesian life and culture.

J. M. Steel and Co. Ltd. have moved to Norwich Union House, 73/79 King Street, Manchester 2.

'New look' Leyland double-deck buses. On left is the all-steel structure as normally fitted on Leyland double-deck bus chassis with enclosed radiators, and on the right is the new glass-fibre reinforced plastic structure. Orders for £160,000-worth of these buses have already been placed

Specifying a Rubber Product

FBRAM PUBLICATION SORTS OUT THE CONFUSION

Rubber specifications present special difficulties to the engineer, not only because the physical behaviour of rubbers differs so profoundly from that of metals and other engineering materials, but also because rubber technology has advanced so rapidly that it is difficult for even a specialist to keep abreast of the full range of modern developments. For some time now rubber manufacturers have been concerned at the number of specifications met with in everyday practice which are for one reason or another inadequate to their purpose and sometimes even positively prejudicial.

A most important move to meet these difficulties is the publication last week of a short Guide to the Drafting of Specifications for Rubber Products by the Federation of British and Allied Manufacturers. Copies may be had free of charge from the Secretary, 43 Bedford Square, London, W.C.1.

AN engineer's specification for a rubber component may vary from a simple request for 'something like this made from synthetic rubber' to an elaborate document listing a variety of physical properties required. One may be as bad as the other. Low swelling in solvent may be emphasized when the component is only occasionally in contact with the liquid; high elongation at break may be specified when the condition of use may not require it.

The disadvantages that lay in over simplification are obvious. Over elaboration — specifying qualities or control tests that are not really relevant to the job the component will have to do — may lead to unnecessary costs and to the suppression of some really desirable qualities.

In 1957 a number of rubber technologists at Dunlop and Dowty Seals got together to tackle the problem. They formed what became known as the Dunlop/Dowty committee on rubber engineering specifications, the members being: L. Crompton, R. M. Thomson and E. Martin of Dunlop, and M. E. Grindle of Dowty Seals. In March 1959, after doing much groundwork, they asked the FBRAM technical committee for assistance.

The Federation formed a Specification Advisory Committee with the Dowty/Dunlop committee as nucleus and Miss C. H. Chenhalls as secretary. Under the chairmanship of F. H. Puxty (Greengate and Irwell) and later of F. T. Bowden (Northern Rubber), chairman of the Mechanical rubber association's technical committee, they were joined by G. B. Benson (Wm. Warne), who is chairman of the wrapped rubber hose association's technical committee, A. W. F. Chatfield (North British), W. E. Felthouse (BTR) and Dr J. R. Scott (RAPRA). Three of the present members — Mr Benson, Mr Bowden and Dr Scott — are members of the Federation's technical committee.

This advisory committee has moved very swiftly and successfully; a month after it was formed an article attacking the problem appeared in *Engineering* and later successful links were forged with the rubber specifications sub-committees of the Society of Motor Manufacturers and Traders and with the Society of British Aircraft Manufacturers. Now comes the publication of this guide, which is the first real step anyone has taken towards rationalizing the present confusion.

It gives advice on the kinds of test most useful for performance testing (by the user) and quality control testing (by the manufacturer), and on the dimensional tolerances appropriate to different kinds of rubber component. Naturally it recommends the use of British standards wherever these are available and suitable for the purpose required, and especially of standard tests as set out in the various parts of BS 903.

Above all it emphasizes the importance of consulting the rubber manufacturer at the earliest possible stage in the design of a new component or the drafting of a new specification. He can ensure that the properties most vital for the particular application are given due priority, and that the tests prescribed are practical, effective, and adequately related to ultimate performance. Moreover, situations frequently arise in which a slight modification in design will enable a standard form of bush, seal, mounting or coupling to be used with considerable saving in trouble and expense; or it may be possible by a slight modification in the shape of a component to reduce considerably the cost of manufacture, and improve the ultimate performance as well.

To facilitate the necessary exchange of information between user and manufacturer, the guide is accompanied by a series of questionnaires, indicating in detail for some of the main categories of rubber products the information on function, properties, and service conditions which will be needed for the drafting of a practical and effective specification.

The FSAC Questionnaire

The questionnaire is in two parts. Part 1 covers questions that apply to most if not all rubber products. Part 2, covers specific products in more detail. Questions from Part 1 are given below.

1.1 Precise function of the article or material.

1.2 Operating temperature: normal operating temperature or temperature range, and maximum and minimum temperatures likely to be encountered and for what periods. Indicate if different parts will be at different temperatures, *e.g.* the inside and outside of a hose conveying hot liquid.

1.3 Exposure to light, radiation and gases: state if the rubber will be exposed to: 1.31 sun, or other strong light. 1.32 high energy ('atomic') radiation. 1.33 outdoor air. 1.34 atmospheres containing ozone, *e.g.* from corona discharge. 1.35 corrosive gases: *e.g.* chlorine.

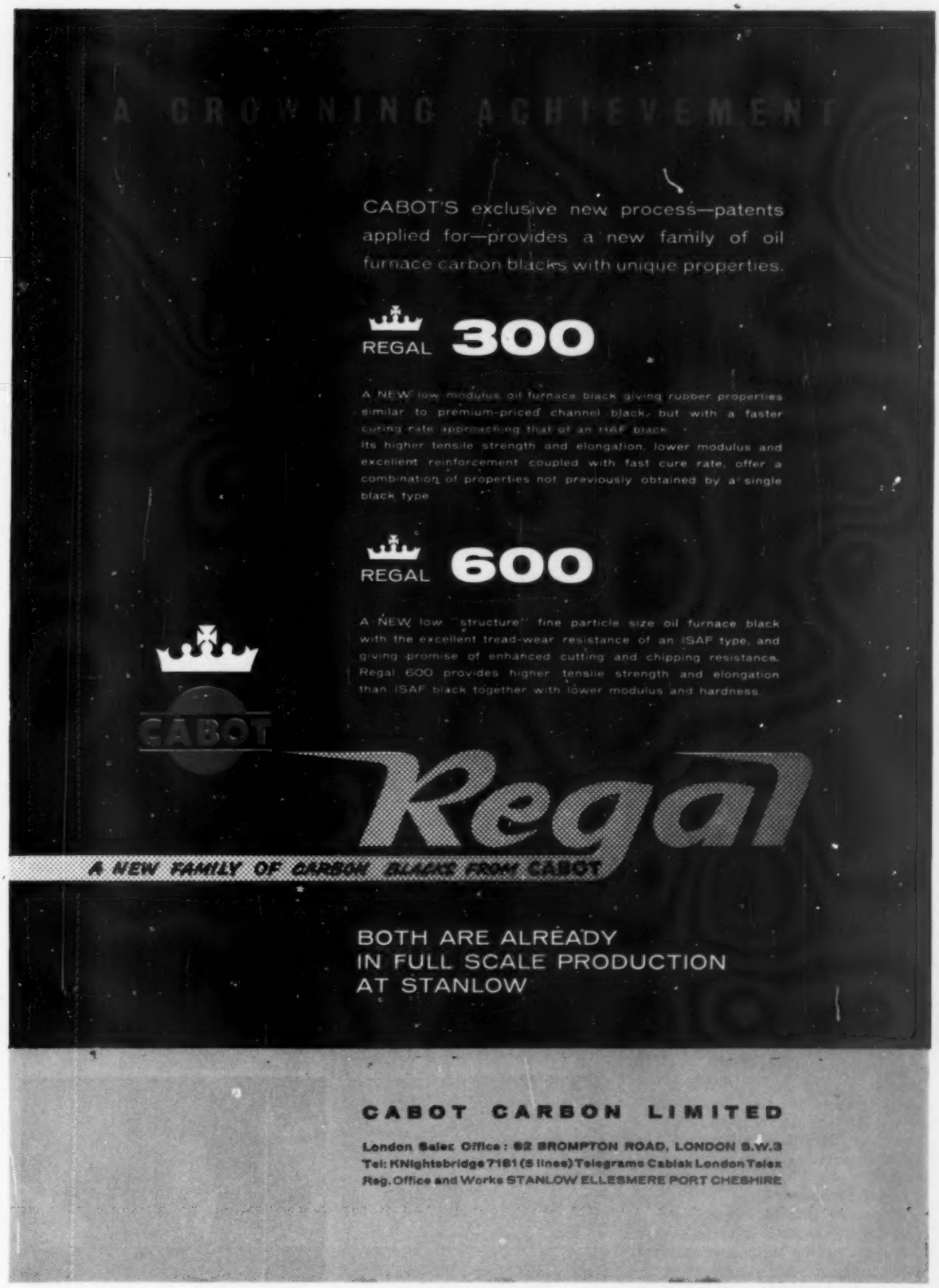
1.4 Exposure to liquids: state if the rubber will be subjected continuously or intermittently to the action of any liquid, for instance: 1.41 water (fresh or sea) or rain. 1.42 anti-freeze solutions. 1.43 liquid fuels. 1.44 lubricating oils or greases. 1.45 hydraulic fluids. 1.46 refrigerants. 1.47 corrosive chemicals, such as acids, strong alkalis or hypochlorites, etc. Give the nature or composition of the liquid as fully as possible and state if the rubber will be immersed or subjected to splashes, spray, or mist of the liquid. (See also specific questions relating to hose: Part 2 E.)

1.5 Abrasion and cutting: state if the rubber will be subjected to any rubbing, abrasive or cutting action and give details, including those of any materials producing abrasion.

1.6 Electrical requirements: state any electrical requirements of the article, *e.g.* insulation resistance, dielectric strength (break-down strength), dissipation of static charges (anti-static or conductive rubber), low dielectric power loss.

1.7 Contact surfaces: state with what surfaces the rubber will be in contact and if staining is important.

1.8 Flame resistance.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A NEW low "structure" fine particle size oil furnace black with the excellent tread-wear resistance of an ISAF type, and giving promise of enhanced cutting and chipping resistance. Regal 600 provides higher tensile strength and elongation than ISAF black together with lower modulus and hardness.
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Problems of Compressed Education

NATIONAL COLLEGE HOLDS ITS SEVENTH CONVOCATION

THE problem of compressing into a traditional course the learning now demanded of technologists was a serious one, said Dr F. H. Cotton, head of the National College of Rubber Technology, in his report at the college's seventh convocation last week. How may coverage be increased without treatment becoming too shallow or inducing indigestion?

This year's LIRI results underlined the urgency of this question, he went on. Hundreds of part-time students throughout the country were studying for the Licentiateship; out of the 84 that sat the examination this year only 16 passed — 19%. Are we, like others, he asked, trying to put a quart into a pint pot?

Dr Cotton reported that for the eighth year in succession the college population had increased: accommodation intended for a maximum of 90 had had to cope with 129 plus a part-time load of 200. During the year the councils of the Plastics Institute and the Institution of the Rubber Industry had defined a large area of science and technology common to the two industries and had set up a joint board to administer examinations at the Associateship level. Dr Cotton regarded this as a first step towards simplification and rationalization of teaching.

Mental Gymnastics

Reporting that the tutorial system had been introduced into the college, he said that this stimulated reading, self-expression and 'mental gymnastics.' 'Practical experience drives home theory,' he continued, 'perhaps that is why one student in the four-year Sandwich Associateship course passed the AIRI at the end of his third period of six months in the college!'

Dr Cotton went on to list the college's external examination successes. Fifteen students gained the AIRI, 73% of the college's FT candidates passing, compared with the national average of 45%. In the Plastics Institute examinations the National College submitted more candidates than any other, and obtained the highest percentage of passes. Eleven part-time students passed the diploma of the PI, four the graduateship and three the associateship. He also reported good results in the City and Guilds examinations in rubber workshop practice and in plastics technology.

Papers Published

Twenty-five papers were published during the year by college staff and students. Two that Dr Cotton referred to were a paper by Dr Ceresa on the mechanico-chemical reactions of polymers, and one on a history of the plastics industry by M. Kaufmann. In the latter Mr Kaufmann had found that one of the first factories to make celluloid products a hundred years ago was the Holloway Collar Co. in Benwell Road just behind the National College. The investigations had led the Plastics Institute to organize centenary celebrations for the plastics industry to be held in 1961.

Better Value for Money

Speaking about a visit he had made to USA and Canada, Dr Cotton said: 'I discussed education, rubber and plastics technology with many authorities. I learnt much and gained new ideas; but returned convinced that we get better value for money in England. The National College seems to excel in its sphere of activity.' He also referred to visits to factories made by Dr Langton under an award from the Nuffield Foundation in connexion with the teaching of mathematics to polymer students, and a visit to Moscow by Dr Ceresa, who delivered a paper at the Macro-Molecular Symposium.

Amongst the many people to whom Dr Cotton expressed his thanks for helping the college during the year were Dr T. J. Drakeley, who had just recovered from an illness, and A. A. Part, deputy secretary, Ministry of Education, who presented the diplomas and prizes.

Mr Part congratulated the college on its progress, and referred to the important expansion scheme which would take place in 1962 and 1963 when new buildings costing £200,000 would be erected.

He stressed that the college, the only one in its field, was a *national* college, and so industry had a special duty towards it. Industry had helped with the equipment for the present

At an informal reception before the convocation are (*left to right*)**: G. H. Bush (ARDE War Office) and Dr F. H. Cotton (head of the National College); G. E. Godfrey (vice-chairman of the NCRT board) and Herbert Rogers (chairman of the NCRT board)**

More people at the reception (*left to right*)**: R. Currell (secretary to the college) and R. Burgess (Ministry of Education); D. O. MacDougall (Shell International), R. A. Sackett (BTR) and P. G. Croft-White (Shell Chemical)**

building, and he hoped it would do the same for the new extensions.

Turning to sandwich courses, Mr Part said that the number of students taking these was disappointing. The industry was not used to taking on students at 18, and putting them through college. In 1955 there were 1,400 sandwich students of all kinds, now there were 10,000, and shortly he expected there would be 15 to 20,000. He urged the rubber industry to co-operate more in this kind of education.

Dealing with the approach to schools he said: 'Further education is often a mystery to grammar school teachers. Technical colleges which have grown up over the last few years are a whole new sector of education that should be put across to schools. The National College does not loom large in schoolmasters' minds: it has to be put there.' He thought that one way to do this would be for members of the college and representatives from the rubber industry to attend school prize-givings.

Responsive to Change

Quoting Bevan's remark that England was 'an island of coal surrounded by fish,' he went on to say that the country's main natural resource was its people. Education had to produce more skilled manpower, more scientists and technologists — but, he added, they had to be responsive to change.

'The job is not to teach rubber technology, but to produce rubber technologists, or, taking it a stage further — to produce people who can *think* rubber technology.'

The chairman, Herbert Rogers, chairman of the board of governors, expressing thanks to Mr Part, said that for every technologist the college turned out industry wanted ten, and he assured him that the new building would not be too large.

Booknote

In his report Dr Cotton said that 1,703 books had been added to the Northern Polytechnic library during the year — 215 specifically for the National College. The information clerk issued 6,054 publications to students and staff. 'She made a significant observation,' Dr Cotton added. 'Those who make most use of her services come out top of the examination lists!'

Baker Perkins, of Peterborough, has purchased its own aircraft. It is a twin-engined Piper Aztec, carrying four passengers at a cruising speed of 200mph.

Open Night at the National College

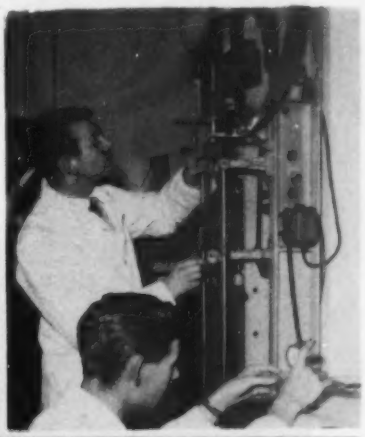
After the convocation the College was thrown open to visitors who saw a large number of exhibits and demonstrations

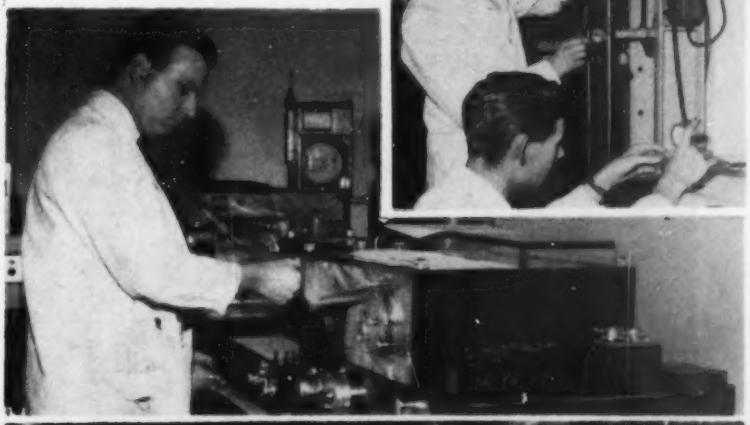
●Measuring elongation at break in the physical testing laboratory

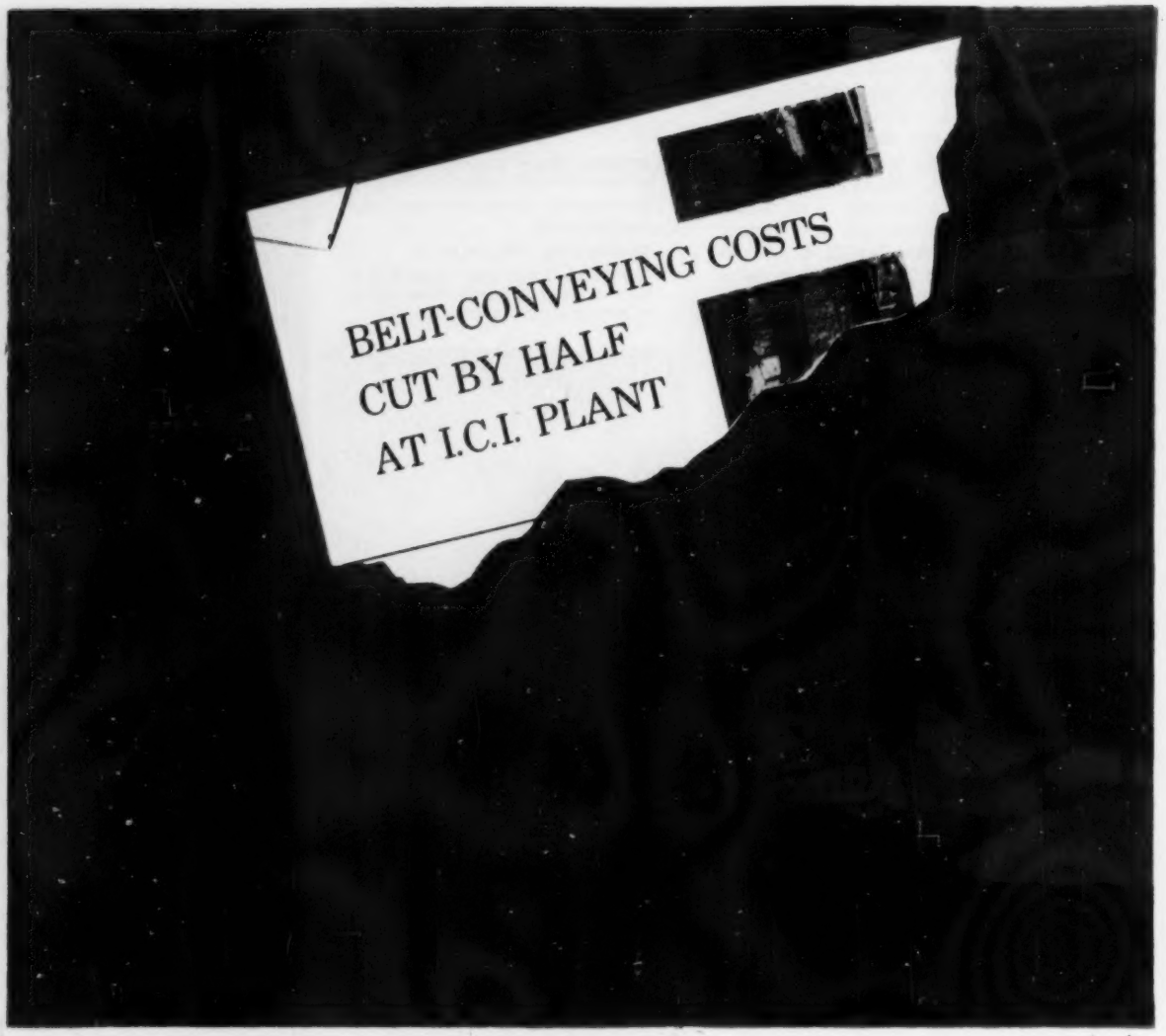
●Research laboratory: infra-red spectrometer

●Extruding PVC hose

●This compression moulder is part of the college's wide range of processing machinery







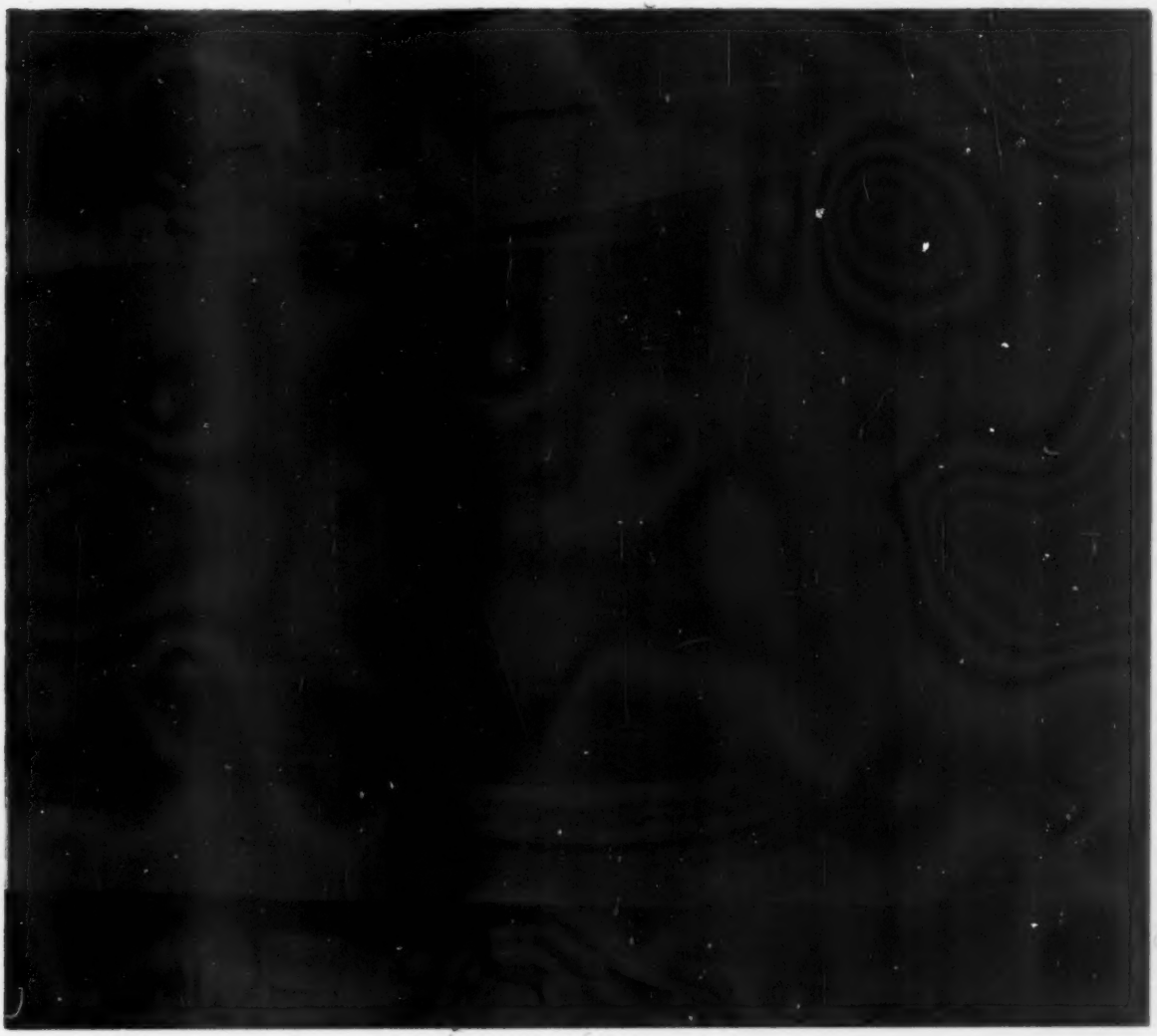
Costs cut–

By installing a Butyl Rubber-covered conveyor belt at their Billingham Chemicals Plant, Imperial Chemical Industries cut the cost of belt-conveying phosphate fertilizer by half.

WORKING life quadrupled

Because of the heat of the fertilizer (about 115 degrees centigrade), its corrosive properties, and the usual damage from moisture and ageing, even the best synthetic rubber belts used previously have worn out in a year, after shifting about 132,000 tons. The Butyl Rubber belt was installed four years ago and has shifted 650,000 tons.

ESSO MEANS BUSINESS IN CHEMICALS



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For information about Esso Butyl Rubber, telephone: HYDe Park 7030, or write to Esso Petroleum Company, Limited, Chemicals Department, 50 Stratton Street, London W1

ESSO MEANS BUSINESS IN CHEMICALS

Chloroform Extract of Reclaim

ITS PROPERTIES AND FUNCTION

By Z. RIGBI (Rubber Research Association, Haifa, Israel)

WHILE studying the properties of a specified Reclaimator reclaim,* we attempted to determine the properties and function of its chloroform extract. To this end, a large extractor was built, and about 0.5kg. of reclaim was treated at a time.

Following extraction with acetone, the reclaim was dried at room temperature, passed 10 times through a tight mill and re-extracted with chloroform. The solution obtained was dried at room temperature and the extract weighed. On a smaller scale, the chloroform extract was found to amount to 27% by weight of the acetone extracted rubber, *i.e.*, 42.2% of the rubber hydrocarbon in the reclaim, but a smaller proportion was obtained from the large extractor as extraction was not particularly efficient. The extract also contained some acetone soluble components.

The dried extract was found to react, at least in part, with oxidizing chromic acid to produce acetic acid, which was identified with lanthanum nitrate as described by Mano[1]. Styrene was also identified in the chloroform extract[2]. The dried extract was found to be substantially insoluble in boiling chloroform, hexane, benzene or trichloroethylene under reflux, and completely so after re-extraction with acetone.

Its density was determined as 0.956, and by using Flory's swelling method, we determined the apparent molecular weight between cross-links (M_c) as 2.9×10^4.

We successively compounded into a modified Reclaimer's Formula the original reclaim, acetone-extracted reclaim, chloroform-extracted reclaim, and the same to which was added a weight of lightly masticated smoked sheets equal to the chloroform extract. The William's plasticity decreased with successive extractions, but the addition of the smoked sheet rubber resulted in a partial recovery of plasticity. However, Curometer[3] curves of the compound based on the acetone-extracted reclaim and the compound of rubber plus chloroform-extracted reclaim were identical, indicating that the chloroform extract undergoes cross-linking in the presence of sulphur and accelerators in much the same way that raw rubber does. In spite of residual accelerators in the reclaim, the acetone-extracted reclaim showed a definite tendency to cure faster than the original reclaim, and it is possible that the acetone extract contains vulcanization inhibitors deriving from breakdown products of the rubber or added reclaiming agents.

*U.S. Rubber Reclaiming Co., Reclaim R341.

The mechanical properties of the sheets cured 15 minutes at 143°C. were as follows:

	M 200%	TS	EB	H
Reclaim as received	250 p.s.i.	620 p.s.i.	360%	48° ISO
Acetone extracted reclaim	960	1050	220	68
Chloroform extracted reclaim	—	970	95	88
Ditto + smoked sheets	—	665	160	69

The lower values obtained on replacement of the chloroform extract by smoked sheets may be due to obviously poorer dispersion of the latter as compared to the former. The reclaim itself had the following analysis:

S.G.	1.15
Acetone extract	17%
Chloroform extract of acetone-extracted reclaim:	
Before milling	15.2%
After milling	27.3%
Ash	5.6%
Carbon black[4]	24.2%
RHC (by difference)	50%

It would therefore appear that at least part of the chloroform extract of reclaim is, in fact, rubber attached to the rest of the network by means of weak cross-links which can be broken by milling. These broken cross-links are not deactivated (probably being stable radicals), but can reform in time. Because of their relatively low density and of interference from other components of the reclaim, they reform only slowly (*cf.* the gradual loss of chloroform extract with time) but once extracted and concentrated, the cross-links reform rapidly and are then stable.

It would be interesting to find out whether the chloroform extract also diminishes with time in the presence of known free-radical traps, and to what type of sulphur cross-linkage the measured value of M_c corresponds. Unfortunately, the work had to be stopped at this stage, and no facilities were available for employing the technique developed by Studebaker and Nabors[5] for the characterization of the cross-links.

However, the mass was dissolved by cold benzene to which ethyl mercaptan was added, and the addition of iodine to the solution caused immediate gelling of the rubber. This behaviour is similar to that described by Clifford and Gladding[6] who postulated a scheme:

$$\text{(Polymer)} - S - S - \text{(Polymer)} \underset{I_2,\, O_2}{\overset{RSH}{\rightleftarrows}} 2\text{(Polymer)} - SH$$

The above evidence indicates that reclaiming, at least by the Reclaimator process, *results not only in depolymerization, but also in partial devulcanization* — a point of view which has not been regarded with favour in the past.

The work leading to the preparation of this note has been made possible by a grant from the Ministry of Commerce and Industry, Jerusalem. I wish to thank Mr B. Zidon for his assistance with the experimental work.

References

1. Mano, E. B., *Rubb. Chem. Tech.*, 1960, **33**, (2), p. 591.
2. Federal Test Method 15011, Standard 601, 1955.
3. Shawbury Curometer by H. W. Wallace & Co. Ltd., an instrument which plots a function of the shear modulus as cure progresses.
4. Determined by the method of K. Weber and F. Schultz, 1956, *Plaste u. Kautschuk*, **3**, 270.
5. Studebaker, M. L., and Nabors, L. G., 1959, Proc. Int. Rubber Conf., Washington, p. 237.
6. Clifford, E. F., and Gladding, E. K., 1959, Proc. Int. Rubber Conf., Washington, p. 543.

'E' Glass Production

Glass Yarns and Deeside Fabrics Ltd. are now producing a complete range of plastics reinforcements in low alkali 'E' glass. Chopped strand mats are being made suitable for contact mouldings, press moulding, or translucent panels, and rovings for pre-form machines, glass/resin depositors, weaving and pipe winding.

Mr F. King, financial controller of Formica International, has been appointed a director of Formica.

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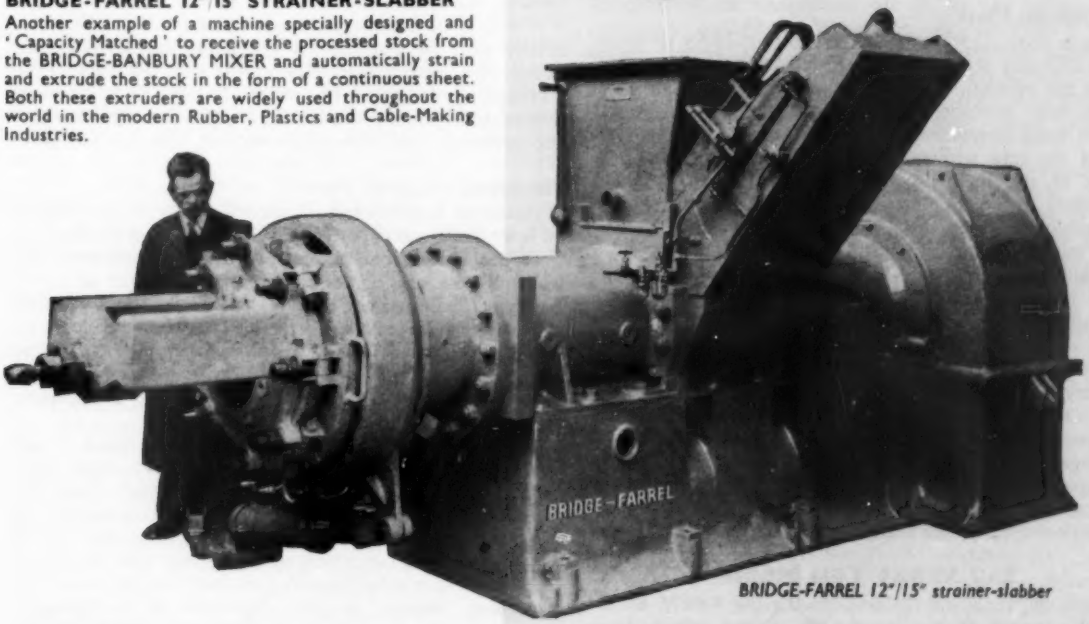

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VIEWS *and* REVIEWS

ONE of our readers complains — justly but inaccurately — that recently I used the word 'pigment' when I meant merely 'compounding ingredient.' Let me go over some definitions.

Mean What You Say

As I see it, all the components of a mix are 'compounding ingredients' and I distinguish three kinds of them: (1) the polymer(s), (2) ingredients added in order to achieve a specific, technical effect, such as to make processing easier, or to confer or improve a property, and (3) diluents, added to reduce the material cost.

I must call the polymer a compounding ingredient because there are some mixes in which the polymer is not the largest single component. In rubber mixes, reclaim but not factice will be included as a polymer.

Class 2, includes sulphur, accelerator, antioxidants, reinforcers and softeners. The ingredient I incautiously called a 'pigment,' was, in fact, a metallic powder added to increase the electrical conductivity; the word 'pigment' should be restricted to mean a colouring agent.

The Difficult Class

It is in class (3) where a real difficulty is likely to occur. It is a difficulty arising from a difference in usage. There are, in my opinion, two types of diluent and I call them 'fillers' and 'extenders.' A filler I define as: 'A powder used in large proportions in order to reduce the material cost of the mix without substantially affecting the properties of the final product except to dilute them in proportion to the amount employed.' An 'extender' is an organic substance, often liquid, which does the same.

A 'reinforcer' or a 'reinforcing agent' I take to be a compounding ingredient which is added in order to increase one or more of the three properties of tensile strength, abrasion resistance, and tear resistance. Notice that I have not included what is often called 'modulus,' meaning the load at a specified elongation.

In my language, there is no such thing as a 'reinforcing filler'; the term is almost self-contradictory. Also, I do not care for the term 'filler loading' which seems to me tautological and can be more easily replaced with 'filler,' for the substance, or 'filling,' for the operation.

I know there is a lot to be said on the other sides and authorities to be quoted; but this is a review of my views.

Say What You Mean

Last week, I did not finish reviewing the ASTM Bulletin. Except for the list of new SB rubbers, which those interested can find in the rubber journals also, I had dealt fairly faithfully with the items of possible interest to people in the polymer industry, but I wanted to have a glance at the two succeeding issues, that is those for September and October 1960, because I am once more impressed by the value of this journal to our industry.

Naturally, some of the papers reproduced are aimed at selling the idea of Standards, and ASTM Standards in particular, but I see nothing wrong in that: I think our own BSI could do the same with advantage. Two such papers are 'Sound Standards Stimulate Manufacturing' by Paul McCoy, and 'Standardization and the Purchaser' by W. C. Brunberg (the first is in the September number, and Brunberg's paper appears in the October).

McCoy is rather naive. He outlines, a little fancifully, the beginnings of measurements based on various parts of the human body and their development into more reliable standards. From standards of lengths and their imposition by rulers, McCoy passes to industrial standards which are of a different nature, being changeable, indeed progressive with advancing knowledge.

Common Fund of Knowledge

'No company,' he says, 'can rely solely on its own resources to develop its technology. Its chances of keeping abreast of competition are determined in large part by the ability of its personnel to tap the common fund of knowledge . . . which in turn depends on the existence of national and international standards, terms, symbols, weights and measures, methods of test, methods of presenting data, and the like.'

Liaison with other companies is important and frequently carried out through standards and the organizations for dealing with them.

'In actuality standards are tools' which can and do become out-of-date and therefore should be revised when it is seen to be necessary to re-sharpen the tool. He deals briefly with the difficulty of predicting service life from accelerated performance tests and he ends with a plea for 'dynamic standards' by which I take him to mean standards which are and can be kept in line with developing materials, processes, requirements, and knowledge.

Purchasing Point of View

Brunberg largely confines himself to the field in which he is evidently an expert — purchasing — and his illustrations are taken from his own industry of railways. But his problems are, in essence, precisely those of L. J. Lambourn whose work on tyre-standardization I referred to last week. Brunberg clearly sets out the advantages of standards: better quality, broader competition, more sources of supply, lower unit costs, long-range planning with smaller stocks. He quotes very forceful examples to prove these and other points.

He looks at the difficulties too. 'I have heard it said many times that when executives are asked about their feelings on standardization they immediately have the reaction that it is a good thing, but in following this up it is generally found that he will agree to standardization as long as others concerned will go along with his ideas.' Opposition to standardization goes much further than this, of course, though, in my experience it is generally emotional rather than objective. Brunberg supports McCoy in asking for progressive standards. '. . . it is not the standards that retard progress but the failure to revise them when the need arises.'

Standards Make for Precision

He likes purchasing standards because 'they become the means of clear communication.' I know I have torn that phrase from its context where it had a more limited meaning but I do so to emphasise my own contention that standards are in no way different essentially from dictionary definitions. They enable you to say what you mean with more precision.

It is for that reason that I welcome the paragraph on page 26 of the ASTM *Bulletin* for September 1960:

COMMENT ON SCIENTIFIC AND INDUSTRIAL MATTERS

by **F. C. JENNINGS**

'New definitions of the terms "rubber," "rubber-like," and "rubber products" will be submitted to the Society for publication as Tentative Definitions of Terms Relating to Rubber and Rubber-like Materials (D 1566). Committee D-20 on Plastics is also studying these definitions.' Will somebody tell me how British practice compares with this?

Rubber Plastics and Plastic Rubbers

Are our American colleagues giving us a lesson in tactics and diplomacy? On page 28 of the same journal is the following: 'Since rubber may be considered an elastomer, and since many elastomers may also be considered to be plastics, there have been some differences of opinion surrounding the definitions of these terms in Committees D-11 on Rubber and D-20 on Plastics. To come to some understanding, the two committees have established a Joint Committee on Definitions. At the annual meeting, this group arrived at definitions for "rubber" and for "rubber-like," which will be balloted in the respective committees to obtain agreement, if possible.'

In Great Britain, technologists and others in the industry are no less interested in this problem which lies at the basis of the desirable and inevitable co-ordination of the plastics and rubber industries. Rumours are rife. What is happening? People in the industry know that I have an interest in this sort of thing and that I write this weekly commentary on matters concerning rubbers, plastics, high polymers, but no one ventures any information. In the USA it can be published in print for all to see; in Britain, responsible writers, publicists and technologists can be kept in the dark by the two Federations, the two Institutions, the Institute and the Research Association.

300 Million Combinations

Two more items of interest from the September 1960 ASTM *Bulletin* deal with PVC and skidding. There is such an enormous variety of PVC formulations, processes, and properties that a new ASTM specification is imminent which 'is in part a classification for PVC resins, enables the designation of properties for more than 300m. possible combinations. This astronomical number of compounds ... can be specified through the use of nine different property levels for six different properties. By extending the nine property levels into subcategories, a total of 26 different property levels can be specified for the six properties for general-purpose PVC resins. For vinyl dispersions for use in organosols and plastisols, a similar classification scheme is provided with 26 property levels and three properties. For dispersions, over 17,000 possible combinations can be designated.'

Skid Resistance

ASTM has now organized Committee E-17 on Skid Resistance. All types of traffic surfaces will be considered though primary attention will be given to highways and runways. The approved scope of the committee is to stimulate research and to develop and standardize field and laboratory methods. Possible sub-committees will deal with: stopping distance test methods, trailers, laboratory-field co-ordination, standards of slipperiness, tyre characteristics and significance, and measuring side friction.

Testing the Tests

In the October ASTM *Bulletin* there are details of a publication of four papers on Quality of Observations (STP 288) aimed at providing a better understanding of the importance and meaning of the terms 'precision' and 'accuracy.' There are specifications on page 24 for three new SB rubbers and one SBR latex. A paper by Elmer and Harrington of Monsanto's plastics division deals with 'Flexural and Impact Variations of Phenolic Mouldings: A Statistical Round-Robin Study,' on page 35. It shows than transfer-moulded specimens had greater flexural strength than compression-moulded, while impact strength was the other way round, the dead end of the transfer-moulded specimens being stronger than the gate end. The paper is possibly of greater interest for its analysis of the differences between the various testing laboratories, and for its insistence on the prime value of a carefully worked-out and specified test method combined with careful adherence to its provisions.

Speeding Up Exposure

I cannot do more than summarize the conclusions of a good paper by Spengeman and Wormald of du Pont on page 29, entitled: 'Lightfastness Testing of Pigment Colours.' The paper deals with that recurring problem of correlating laboratory-accelerated test treatments with service results, in this case with actual outdoor exposure. In spite of the widespread use of devices having high ultra-violet-emitting light sources, with or without water sprays, the published quantitative correlations of acclerated and actual outdoor exposures are relatively scarce. To fill this gap, the authors here report their studies on a variety of markedly different pigments exposed under the same conditions.

They conclude that 'it does appear that accelerated fading devices can provide rapid and reliable colour-retention data' but that 'the full potential value of these instuments can be realized only when supported by an adequate background of correlating data ...' There are wide differences in the time-relations (outdoor divided by laboratory) for the different pigments; there is no advantage to be claimed for either wet or dry accelerated exposure.

Water Barrier

'Water Permeability Studies on Latex and Latex Paint Films' is the title of a paper by R. C. Simon on page 48. It discusses the testing programme which resulted in the design of successful latex paints for exterior wood applications. Panels were exposed in the laboratory weather unit and also out-of-doors. In this way, paints and primers tested included styrene-butadiene, acrylates, PVC, PVA, copolymers, and mixtures. These tests were supplemented by two other test methods: water absorption directly from liquid water, and an electrical conductivity method. The original paper must be consulted for the detailed results; it will suffice to say here that a PVC latex primer and topcoat proved an effective water barrier, and specialists should study the conductivity method used to distinguish between permeability of liquid water and water vapour.

Finally in this survey of the October ASTM *Bulletin*, there is a fair summary on page 21 of the very difficult problem of measuring the fire hazards of plastics. It gives references not only to ASTM standards but also to other literature.

I hope that these detailed reviews in this issue and in last week's, show that the ASTM *Bulletin* is a useful source of technical information. CHARLES JENNINGS.

MEN *and* MATTERS

A Review of People and Events

by Peter Richards

LEIGHTON SMITH of North British, one of the best known sales executives in the rubber industry, has retired after half a century in the industry, including 38 years with the Scottish firm. I understand that he is not severing his connexion altogether, as he is remaining with North British for a time in an advisory capacity. On leaving school in Leeds in 1910 his first experience was with Industrial Rubber Merchants in Leeds handling a variety of rubber products and garments. Along came World War I and Leighton Smith volunteered for the Leeds Business Men's Battalion (The Leeds Pals as they became known) of the 15th West Yorkshire Infantry.

He gained a commission and then, on returning to civvy street, became manager of the rubber merchant's business he was with before the war. He joined North British in 1923 as a salesman in Yorkshire handling all company products, including solid band tyres. In 1949 he was appointed Northern sales manager operating from Edinburgh — his first break from his home ground of Yorkshire. For nine years Leighton Smith was a key figure in the sales organization at Edinburgh, latterly as sales manager, general products division. Three years ago, when the sales side became centred in London, he moved South to head the sales activities of general products.

Healthy State

Leighton Smith's first relaxation used to be golf, which he played with rare enthusiasm. Secretary of Garforth Golf Club for 18 years and captain in 1935, he contributed a lot to the healthy state of the game in Yorkshire and was made an honorary life member. He was a member of the Institution of the Rubber Industry, chairman of the Rubber and Plastic Flooring Association and on the council of the Federation.

After 50 years packed with activity Leighton Smith certainly deserves a rest — but it is good to know that, since he is carrying on in an advisory capacity, he will keep up his long connexion with the industry.

Storeys' New London Manager

Storeys of Lancaster have appointed D. Clark as London area manager. Mr Clark has been with them for over 10 years and has a wide knowledge of Storeys range of PVC products. In recent years he has specialized in the domestic field and, until his new appointment, was Southern domestic sales manager.

I. F. E. Coubrough, who previously held this post, has resigned in order to take up a directorship with BX Plastics Ltd.

Sir John Hunt (*third from right*) **talks to a group of Fort Dunlop apprentices at a recent presentation of Duke of Edinburgh's Awards. Also in the picture are N. G. Bassett Smith** (*extreme left*)**, honorary award organizer for Warwickshire, and Henry Knott** (*second from left*)**, who runs the award scheme at Fort Dunlop. With seven silver awards and one bronze, the Fort Dunlop achievement is the best so far of any industrial plant in the country**

Prehistoric Polystyrene

As you probably know, this is a picture of a Belemnite, an extinct relative of the modern octopus. There is a difference between this Belemnite and all other Belemnites, however. This one is made of expanded polystyrene. If this sounds a super anachronism as well as unbiological then I ought to add hastily that the reptile is a bas-relief model made by A. Tynan, curator of Newcastle's Hancock Museum. He began using Marleycel expanded styrene some time ago in preference to the traditional clay and papier mâché.

'We have been delighted with the result,' Mr Tynan says. 'Relief models are produced in a fraction of the usual time, and can be incorporated in a vertical display panel with the flimsiest and most inconspicuous supports.'

He is convinced that polystyrene has innumerable further uses in museums and display work. So am I. And why not models for schools — although there may be a snag in going too far in this direction. It's a short hop from school to toys, and, knowing my small daughter, it wouldn't take much to make her ask for a polystyrene pterodactyl in her Christmas stocking.

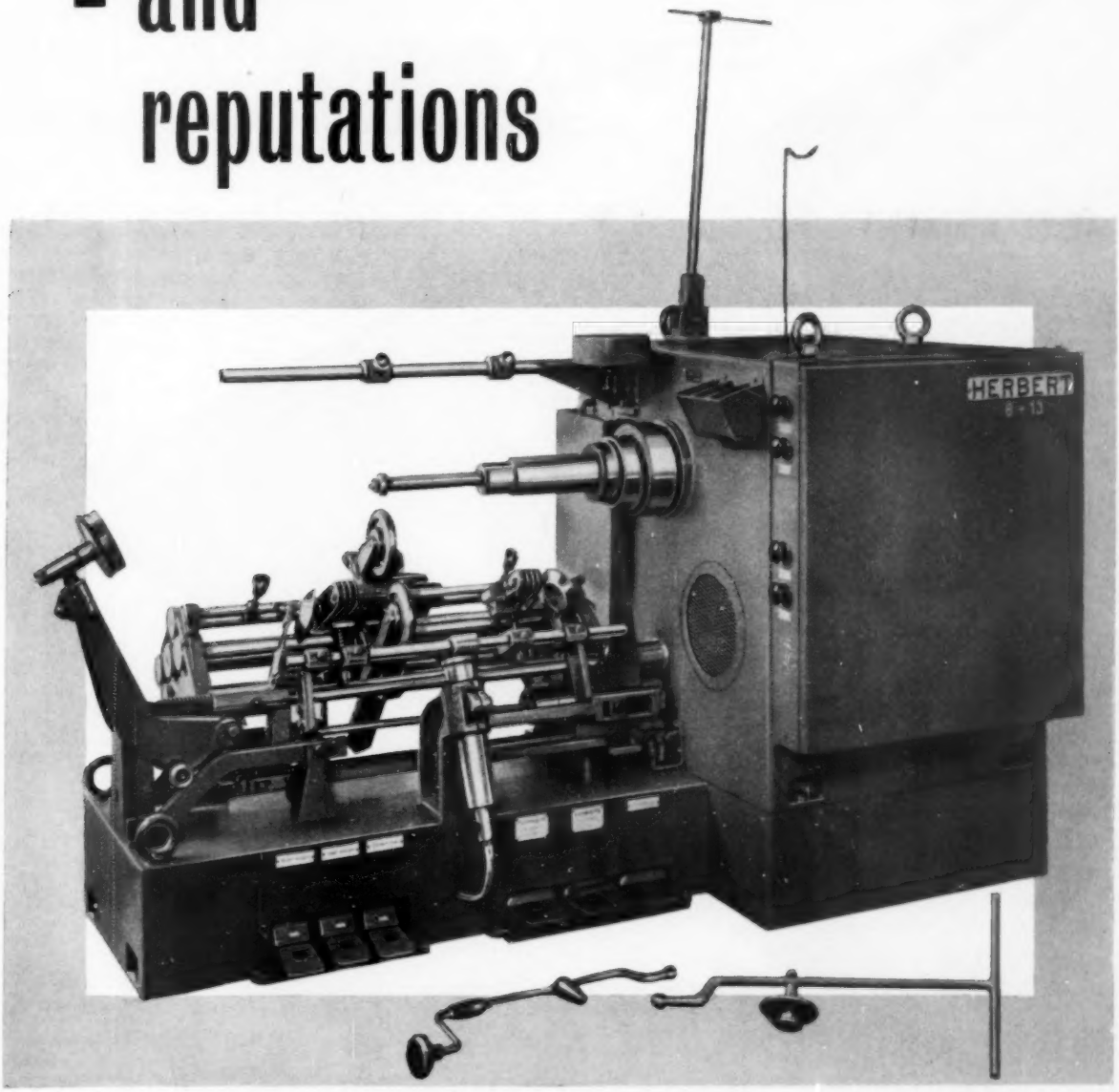
Semon Honoured

A scientist whose basic research discoveries helped shape the modern rubber and plastics industries recently received the 'Distinguished Award of Council' from the Akron council of engineering and scientific societies.

Dr Waldo L. Semon, director of rubber research for the B. F. Goodrich Company, received the honour for work in the fields of synthetic rubber, polyvinyl chloride materials and rubber antioxidants and accelerators.

Dr Semon, who developed 'Ameri-

built to build tyres - and reputations



Manufactured in this country by Baker Perkins Ltd., THE HERBERT TYRE BUILDING MACHINE RB1 will produce tyres in a range of sizes including wheelbarrow, scooter and passenger car tyres up to 13" rim diameter. What is more, the tyre-building system is such that size changes are particularly quick and foolproof. A further feature is the principle of collapsing the drum whilst it is stationary, thus considerably lessening wear and tear.

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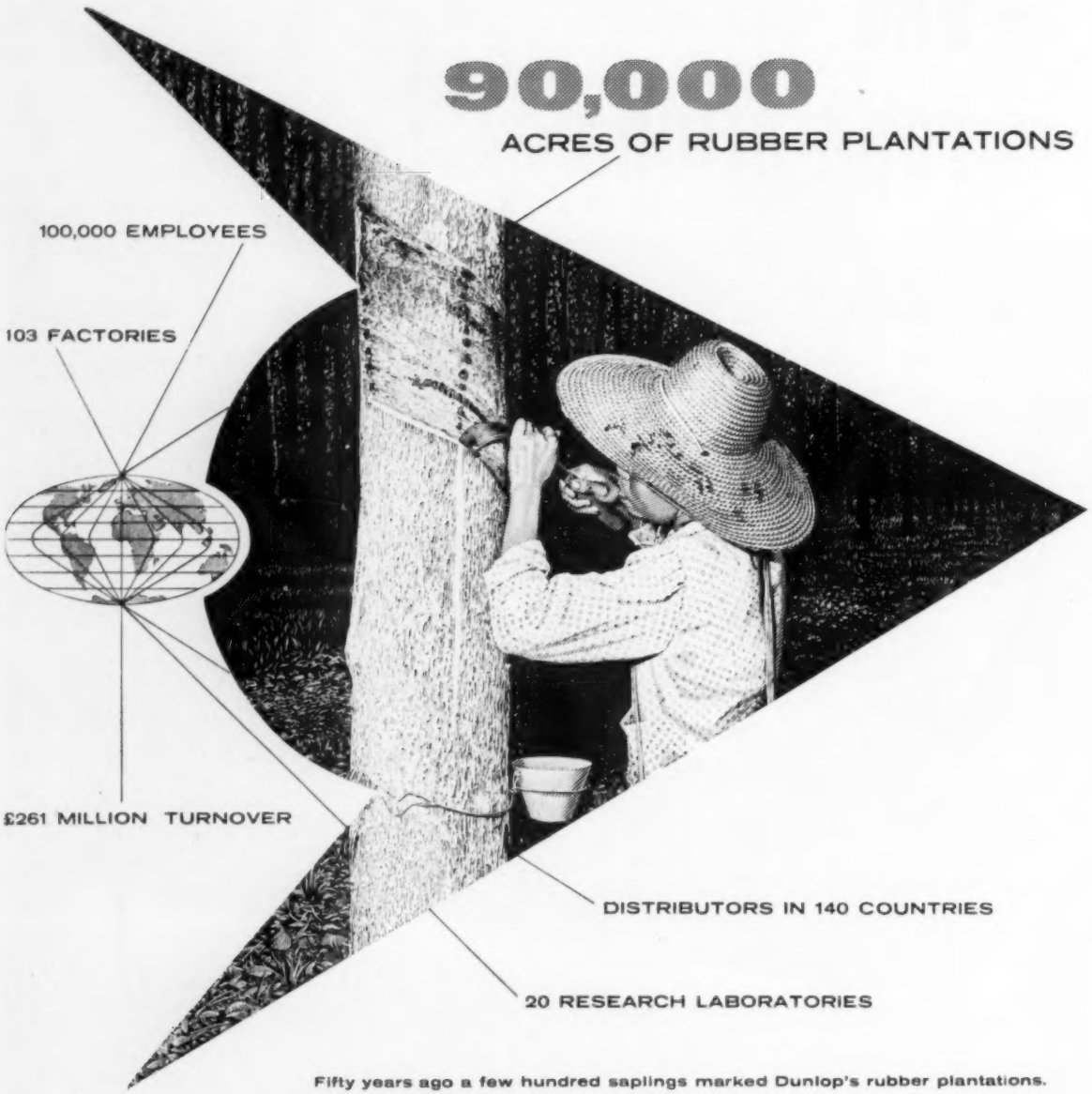


Fifty years ago a few hundred saplings marked Dunlop's rubber plantations. Today these plantations are among the largest in the British Commonwealth. But successful rubber growing needs more than bigness. Increased productivity is as eagerly sought by the plantation supervisor as by the factory foreman. With his own experience and the help of scientific methods he has reaped a harvest.

Not so long ago a yield of 400 lbs. of rubber from an acre was considered satisfactory. Now, yields of up to 2,000 lbs. an acre are not unknown. An example of the creative effort of which the new Dunlop symbol is the hall-mark.

DUNLOP SYMBOL OF PROGRESS

CTH/PRR/52

pol' and nitrile rubbers, joined the research committee of rubber reserve during the war, working on the research, development, and plant design of the US Government synthetic rubber plants. In 1944 the American Chemical Society awarded him the Charles Goodyear Award for his contributions to the chemistry of rubber.

Harry Davis and V. E. Winbolt

I very much regret to report the death of Harry Davis, transport manager of William Warne and Co. Aged 51, he was with the company for 35 years.

He was well known as William Warne's representative on several transport committees including the Federation of British Rubber and Allied Manufacturers, traders co-ordinating committee on transport and the Ilford and district manufacturers transport group.

I am also very sorry to hear of the sudden death of V. E. Winbolt, chief engineer of Blue Peter Retreads. He had been with the company for more than 22 years.

D. J. Bunter has been appointed director of personnel at North British Rubber. This is a new position in the company

The Cost of Research

Usually the rubber and plastics manufacturer is castigated for not doing enough (or, more frequently, subscribing enough) to the cost of research. However, at the London Bankruptcy Court the other week a rubber manufacturer confessed that research had been his undoing.

He had, he said, 'spent too much time on experimental work with rubber and had neglected his bookkeeping.'

Service for the Customer

The North British Rubber Company has announced a new appointment, that of Mr T. L. Welsh as manager of Distribution and Customer Service. The function of this new department is to consolidate and co-ordinate into a single customer service unit all factory finished goods warehousing, branch customer warehousing and traffic.

* * *

The formation of a Speakers' Bureau of the Cellular Plastics Division of the Society of the Plastics Industry, Inc., New York, was announced recently by Dr Samuel S. Steingieser, assistant research director, Mobay Chemical Co., New Martinsville, W. Va., and chairman of this SPI Division. More than 30 speakers, representing all sections of the industry, have volunteered their services. Requests for speakers should be addressed to The Society of the Plastics Industry Inc., Cellular Plastics Division, 250 Park Avenue, New York 17, N.Y., USA.

* * *

With the introduction of a new glass fibre cab, Albion Motors Ltd. are now able to supply their Chieftain, Clydesdale and Reiver trucks and Victor VT19A pantechnicons some 2cwt. lighter in weight than usual. The new cab is now being built in the glass fibre section of Leyland Motors.

The International Synthetic Rubber Co. are touring the country with a small display showing applications of Intol rubbers (*RJIP*, December 3, 930). Enjoying a joke at a London showing are (left to right) Mr and Mrs J. G. Rabl (Productafoam) with R. McEwan and Harry Hornsby (both of ISR)

Question Corner — 147

(Second Series)

472. What is the importance of the gate in an injection mould?

(Answer next week)

Answer to Question Corner — 146

471. Essentially, there are two methods used in vacuum forming. The first is known as female forming and the other drape forming.

As the name implies, female moulds are used in the first method. The thermoplastic sheet material is clamped over the mould and heated. When the sheet is sufficiently pliable a vacuum is drawn between the sheet and the mould, which presses the sheet into the mould. After the sheet has cooled the product is removed.

Drape forming involves the use of male moulds. Here the plastic sheet is supported by a mould clamp above the mould. As the sheet is heated it gradually drapes itself over the high mould projections and, after the sheet has reached the forming temperature, the mould clamp is lowered so that it clamps the sheet round the periphery of the mould. A vacuum is then drawn between the mould and sheet to complete the forming. This method is useful for deep drawn articles.

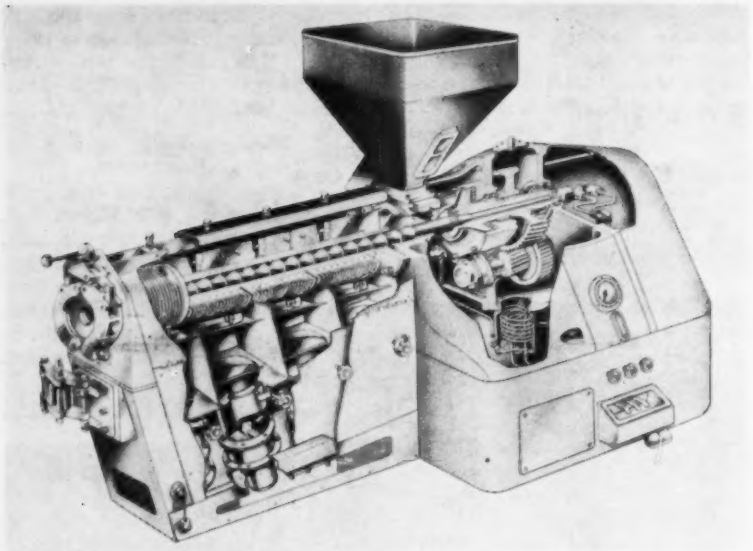
There are a number of improvements and variations on these two methods, and some of them involve the use of compressed air rather than a vacuum, but this is more for the production of hollow articles such as bottles.

(Another question next week)

Polly Ester Says . . .

'Cross-linking agent — irate caddy'

British Thermatic Extruders



Exploded view of the Davis-Standard Extruder showing the main components including the therma-fin heater-cooler jackets and blowers

THE range of Davis - Standard British Thermatic extruders made by Fawcett Preston and Co. Ltd., Bromborough, Cheshire, consists of 3½, 4½ and 6½in. models each available as standard or super models. The super models have longer barrels than the standard and four heating-cooling jackets and blowers instead of three.

The heater-cooler jackets are the subject of a pending patent and consist of a therma-fin jacket having tubular electric heating elements cast into deep finned aluminium casting to provide a large radiating surface. The whole barrel assembly is enclosed in a double walled insulating cover, underneath which are large capacity air blowers to provide a controlled flow of air over each cylinder section.

The alloy steel screw is of the constant lead, diminishing depth type, the leading edge of the first 1½ turns having a sharp radius to aid feeding, is cored for water cooling and available in various compression ratios and designs.

Outlets are provided for one or more head heaters and thermocouples and the temperature controls by West Instruments are mounted in a separate cabinet which can also accommodate all other controls. The capacity of the 3½in. machine is 270lb./hr. with PVC and 330lb./hr. using polythene while for the 6in. model the corresponding figures are 900 and 1,030. Screw speeds range from 146rpm on the 3½in. for polythene to 73rpm on the 6in. model with PVC. Further details are contained in publication FP119 recently published by the company.

Sundt Develop New Extrusion Technique

THE Plasticote process, a new PVC extrusion technique, has been developed by Sundt and Co. Ltd. for producing a low cost plastic cover for brush and broom handles.

The new covering, made from Geon PVC was developed to overcome the drawbacks of the previously used cellulose cover. Unlike cellulose, PVC is non-flammable and does not mark wall paper.

Previous attempts to extrude a PVC cover have not been successful because high production costs resulted in an article at an uneconomic price. Sundt, who are the largest manufacturers of broom handles in the UK, claim to be the only company able to market such a plastic covering at a competitive price. During the development of the new process, the technical service department of British Geon Ltd. collaborated closely with the company.

EPOXY DECK

A new deck coating, based on Union Carbide epoxy resins, has added a modern touch to the *Vema*, a 37-year-old three-masted oceanographic schooner. This research ship belonging to Columbia University's Lamont Geological Observatory, USA, is now on her sixteenth expedition during which she will circumnavigate the Antarctic continent to gather scientific data.

The epoxy coating was selected for the steel deck to protect it from salt-water corrosion, sun, and the extreme temperature changes encountered in sailing from the sub-freezing temperatures of the Antarctic Ocean to the 130°F. (54.4°C.) temperatures in the tropic waters.

A second important factor was the need for a non-skid surface for the steel decks, since the nature of the *Vema's* work in heavy seas makes sure footing an absolute necessity. An abrasive in the epoxy coating provides an extremely effective non-skid surface.

In the coating applications, more than 600 gallons (2,270 litres) of the epoxy compound were used in coating the main deck, the deck-house roof, bridge, battery room, and other

storage rooms of the 202ft. (61.5m.) 500-ton vessel. In most cases the coating was trowelled on to a thickness of $\frac{3}{32}$in. (2.3mm.).

Portable Oases

Collapsible containers manufactured by Fireproof Tanks Ltd., of Portsmouth, are being used as portable oases in Saudia Arabia, or emergency reservoirs in New Zealand. They are manufactured from neoprene reinforced with Fothergill and Harvey's nylon fabric. This combines the strength of the inner nylon fabric with the abrasion protective qualities remaining on the outside of the material.

Silvertown Rubber Co. Ltd. has appointed G. F. Copeland as Midland area manager, belting division.

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The National Chemical Laboratory

WORK IN PROGRESS

THE open days at the National Chemical Laboratory recently were an opportunity to see the newer achievements of this laboratory, which was reorganized two years ago under its present name.

Operations are carried out in six main groups under the Director, Dr S. J. Anderson, F.R.S., who gave his visitors a description of the functions of the laboratory with examples of some of the work at present being carried out.

In general, Dr Anderson explained, the laboratory worked on long range problems — problems of a kind which were not usually undertaken in other laboratories. A second group comprised problems of immediate practical applications such as corrosion where laboratory work could contribute both to scientific knowledge and the national economy.

As examples in the first group Dr Anderson explained that the Chemical Thermodynamics group had been reconstituted and enlarged. It was engaged in collecting thermodynamic data, a task for a few laboratories only working together throughout the world. Co-operation between these laboratories, including some in Russia and the Russian bloc, was possible because the fundamental constants of science are the same everywhere. It was necessary to build up experimental facilities, and equipment especially calorimetric equipment in order to measure heats of formation, entropy, free energy and other thermodynamic constants.

Extraction of Metals

A second example of long range research was to be seen in the work of the extraction of metals group. Some 15 years ago, this group was engaged in investigating extraction and isolation of uranium. A group such as this is a national asset and is now expert on the extraction of newer metals. Their work is being broadened. Work on ion exchange resins had led to an understanding of the mechanisms so that resins can now be made which will pick up any special ion. A highly selective pick-up of gold is thus possible. This means that minute quantities of gold which at present go down the drain at mines could be recovered. Some methods which had been in use for 100 years or more may soon be revolutionized. The methods used for the purification of uranium may be applied elsewhere — solvent extraction plants which are extremely compact are thus possible, the usual filtrations and other older industrial operations being eliminated.

Besides carrying out research which has some practical application, there is also an obligation on the laboratory to contribute to knowledge. An example here is the extraction of beryllium, at present based on empirical methods. The chemistry of these is now being studied. For example, various types of heat treatment of the ore are now applied, based on purely empirical observations and the effects of such heat treatments are being studied.

Ion exchange resins were discovered in this laboratory by Adams and Holmes in 1934. After an interval, research on these resins is again being carried out. The work includes the making of resins in membrane form and methods for increasing their selectivity. Resins which are oxidizing and reducing agents are also being studied.

Corrosion

Corrosion, one of the biggest problems of applied science, is an excellent example of the second group of researches. A number of inhibition methods have been empirically developed. Work now in progress shows an increase in the understanding of the mechanism of inhibitor action. The inhibiting ions must be adsorbed on the metal. Protection by volatile inhibitors is also being investigated. It has now been shown that their action is largely that of transport materials, that is to say they transport the necessary ions to the substances being protected. It is natural, therefore, that such inhibitors should have the correct degree of volatility. Metallic corrosion is estimated to cost the country £600 million per year so that there is no need to emphasize the extreme importance of work of this kind.

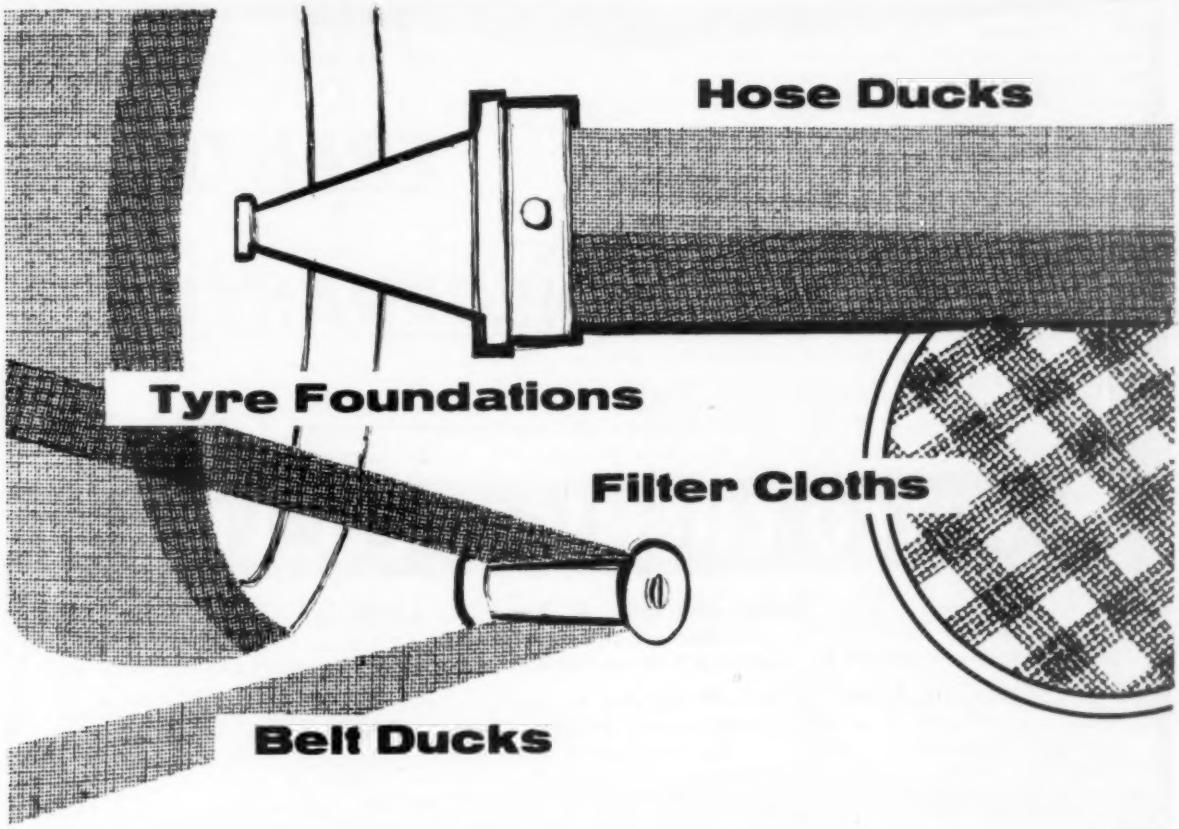
Work is also in hand on problems connected with the corrosion of metals buried in soils. This is essentially a bacteriological problem, the bacteria converting the sulphates in the soil into sulphides. The effect is due to enzymes and the work is closely connected with that on polluted water such as is found in estuaries, for example in the river Thames. Here industrial effluent gives rise to anaerobic conditions. Enzyme biochemistry shows that one strain of bacteria will cause corrosion whilst another will not, and this has great influence on pipe lines, barges and other metallic structures such as are used in estuaries.

Pure Substances

Dr Anderson then gave an example of the work being carried out in inorganic chemistry. He referred to the isolation of the so-called rare earth metals. These, he said, are not really rare at all. They are very abundant but they are not readily accessible. There are large amounts of complex mixtures containing about 14 elements and in order to separate these, ion exchange methods are being investigated. Since these rare earth mixtures are now in production it is clearly of importance that they should be separated and a use found for each of the elements thus isolated.

The extreme purification of materials is also being investigated. Transistors need extremely pure materials, particularly germanium and silicon. The total impurities must be less than 1 part per million, and certain specified impurities must be less than 1 part per 100 million. Amongst the ingenious methods for preparing the elements in such a high degree of purity, one of particular interest is known as zone melting. This method can be applied not only to metals themselves but also to their compounds.

Finally, in response to a question, Dr Anderson gave a short description of the field of research in which he was personally especially interested, namely the field emission microscope. An electric field can remove electrons from a sharp tip. Such a tip could be made with a radius of one fifth or even one tenth of a micron. When a voltage of between 2,000 and 8,000 volts was applied this sucked out electrons and the effect could be seen as a pattern on a screen. Any chemical reaction which takes place brings about a change in this pattern. Thus the details of a reaction may be studied. For example,



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it may be seen what happens when oxygen comes into contact with clean metal. Research here is related to the work of the corrosion group.

Molecular Sieves

Among all the interesting work being carried out in the various laboratories and which visitors were invited to see, a few items seemed to be of particular interest to readers of this journal. Work on plastics under the direction of Mr M. F. Vaughan is mainly concerned with work on ion exchange resins, following on the original discovery from 1934.

The new technique of gel filtration was illustrated and explained. Porath and Flodin have described a method for the fractionation of water soluble substances. This they call gel filtration. Substances are applied to the top of a column which contains swollen insoluble grains of cross-linked dextrane, and are eluted with water. The fractions are collected in order of decreasing molecular weight. This phenomenon is ascribed to the formation of molecular sieves in which the smaller molecules penetrate the meshes of the swollen gel and are retained, whilst the larger molecules, which are excluded, migrate in the interstitial fluid.

The possibility of using this technique in a non-aqueous system to effect fractionation of polystyrene samples using a separating medium of cross-linked polystyrene beads is being investigated.* The cross-linked bead polymers are prepared as follows: 40 parts of monomers is emulsified with 500 of water using 1.5 parts of promulsin as emulsifier in the aqueous phase and 0.25% of benzoyl peroxide on the monomer is used as catalyst. The monomers consist of a mixture of monomeric styrene with divinyl benzene. Work is normally carried out with amounts of divinyl benzene from 0.015 to 0.036 parts per 40 of monomer. The time for polymerization varies from 65 days at 30°C. to 1 day at 80°C. When the beads are prepared they are swollen in benzene and hence lose their identity. The solution under investigation is passed through the swollen beads and fractions are collected. From these the benzene may be removed either by freezing and subliming or by precipitation using methanol as usual in a 7- to 10-fold excess. Viscosity of the various fractions in 0.4% solution is measured. Prior to the use of these cross-linked polystyrene beads, other substances which gave a large surface area such as glass beads, aluminium foil, or 'Celite' have been used for extraction fractionation methods. Now, these cross-linked beads were being used. Other work in the laboratory included viscometry, osmometry, and light scattering — all methods for the investigation of high polymers. For viscosity determination the Ostwald viscometer had now been replaced by the Ubbelhohde instrument. An extremely simple construction enabled thermostatic baths to be operated to an accuracy of 0.005°C. A bare nickel chrome wire was used for heating. This had the additional advantage of preventing the growth of algae in the bath. For osmometry cellulose acetate was used in order to prepare the semi-permeable membranes. The cellulose acetate (5 parts) is dissolved in acetone (90 parts) containing 5 parts of normal butanol. The solution is allowed to dry in a dish until the correct stage is reached. If it is not sufficiently dry the resultant film contains holes, whilst if it is too dry it is impermeable. Details of this method have been published.†

*Nature — October 1 1960, page 55.

Thermostability of Polymers

Work in the field of thermostability of polymers is being carried out by Mr M. A. Francis. The apparatus used is the Stanton thermobalance. This consists essentially of a sensitive analytical balance with a silicon rod attached to the balance beam. This rod carries the substance under investigation. Normally the sample used weighs 100 milligrams. It can be surrounded by gas, for example argon, and its behaviour investigated at temperatures up to 1,000°C. Four hours is sufficient to cover the whole range of temperature up to this figure and the apparatus is entirely automatic, the rise of temperature, the checking of the balance, measurement of weight, all being carried out automatically and recorded on a chart.

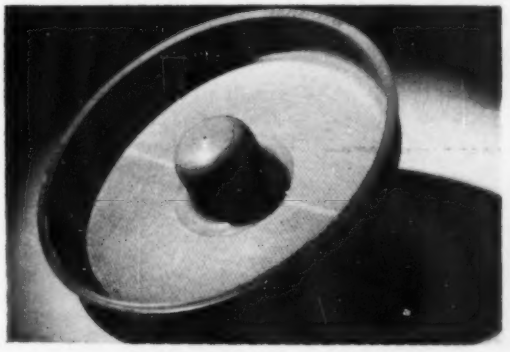
Ion Exchange Mechanism

The mechanism of ion exchange is being studied using several polymers, the chief of these being cross-linked styrene already mentioned. The variation in properties with the structure of the resin being studied includes the chemical nature of the exchange groups, the number of groups exchanged per unit of resin, and the degree of cross-linking. Graphs displayed in the laboratory showed work which had been carried out on the relative affinity for two ions, for example sodium and lithium, potassium and lithium, hydrogen and lithium, sodium and hydrogen, potassium and hydrogen, etc., and it had been shown that this relative affinity depended upon the degree of cross-linkage. The resin used is a sulphonated cross-linked polystyrene. Previously it was possible to have only one sulphonated group for each polystyrene unit. By improved techniques it was possible to vary this. A new series of resins under investigation were those based on chloramine T.

† Nature — January 3 1959, page 43.

Ion Exchange Membranes

A matter of immediate interest which arose was the manner in which ion exchange membranes are prepared from resins which will swell but which cannot be dissolved. The method was, in fact, devised in Holland by TNO and is carried out as follows. A polythene sheet is swollen in a mixture of styrene and divinyl benzene. These components are then polymerized and the polymer is then sulphonated or otherwise chemically treated. The polymer, therefore, remains attached to, or dispersed in the polythene which acts as a convenient support. Both cationic and anionic membranes may be prepared. The former will allow cations such as sodium to pass (but not anions) and the latter will allow anions such as chlorine to pass (but not cations). An important industrial use for these special types of ion exchange membranes was that they gave rise to the possibility of purifying salt water so as to render it fit for drinking. Pure water is obtained using only a small amount of electric power.



The new AEI-Hotpoint Supermatic washing machine incorporates a 'filter-clean' unit to eliminate fluff from the washing water. The unit incorporates a filter gauze and is moulded in one piece from Shell Chemical's Carlona polypropylene P4. It is manufactured by Intermit Ltd., Birmingham, in conjunction with Plastic Engineers Ltd., of Treforest, Glam.

Rubber Statistics

UNITED STATES — UNITED KINGDOM

CONSUMPTION of new rubber in USA in October amounted to 125,675 tons as compared with the 124,100 tons consumed during September, according to the monthly report of the Rubber Manufacturers Association.

Consumption of all types of synthetic during October amounted to 88,455 tons (87,330 tons in September). The ratio of synthetic to total new rubber consumption continued at a high level, reaching 70.38% for October (70.37% September). The ratio for the first ten months of 1960 was 68.79% as compared with 65.68% for the same period in 1959.

Natural rubber consumption for October came to 37,220 tons (36,770 tons). Production of synthetic rubber during October was 111,013 tons (112,853 tons).

Reclaimed consumption for October was estimated at 23,075 tons (22,101 tons).

United Kingdom

Detailed UK import and export figures for October have been issued by the Board of Trade (in tons):

IMPORTS
(including synthetic and reclaimed)

	Oct. 1960	Oct. 1959
Nigeria	1,747	1,260
Singapore	4,832	4,274
Federation of Malaya	8,445	9,373
Ceylon	716	699
British North Borneo	198	470
Sarawak	—	140
Canada	1,780	2,188
Other Commonwealth Countries and Irish Republic	171	128
France	5	—
Viet-Nam	574	302
Indonesia	208	739
USA	3,185	1,802
Other foreign countries	1,327	946
Total	23,188	22,321
Rubber latex	2,738	2,727
Other raw, including crepe	14,904	14,839
Balata	168	20
Synthetic rubber	3,938	3,797
Others	1,440	938
Total	23,188	22,321

EXPORTS
(including synthetic and reclaimed)

	Oct. 1960	Oct. 1959
Commonwealth and Irish Republic	1,756	1,586
West Germany	483	362
Spain	1,100	313
Other foreign countries	2,441	2,196
Total	5,780	4,457
Synthetic and reclaimed rubber	2,739	2,060
Waste rubber	3,041	2,397
Total	5,780	4,457

Plastic Money

A question on plastics coins — what would their cost advantage be over metal, taking into account the need to prevent counterfeiting? — was asked in Parliament last week.

In a written answer the Chancellor of the Exchequer said that he had no estimates for the cost of manufacturing coins from plastics, and 'no present plans for making them.'

The Board of Trade has agreed, provided adequate industrial support is forthcoming, to co-operate with the packaging centre's overseas service in organizing a combined stand at Macropak to be held in Amsterdam from May 2-9.

Book Reviews

MANIPULATION OF THERMOPLASTIC SHEET, ROD AND TUBE.—By J. M. J. Estevez and D. C. Powell. (London: Iliffe and Sons Ltd. for The Plastics Institute.) 148 pp. + xi. Price 27s. 6d.

This volume is the third of a series of monographs which, although planned primarily to cover the syllabus in the technology, chemistry, physics and engineering of plastics leading to the examinations of the Plastics Institute, will also be found useful to anyone wishing to obtain specialized information on a particular subject connected with plastics.

The materials considered in the book are polymethyl methacrylate; polyvinyl chloride and vinyl copolymers; polystyrene and toughened polystyrene; and polythene. A survey of these is given and of the methods by which they can be fabricated into useful goods. Wherever possible a critical assessment is made of the materials and techniques available for a particular application. A detailed account of the properties of the raw materials and end products is followed by sections on machining, decoration and bonding.

The important subject of forming is discussed, the materials being divided into two classes: those suitable for oven techniques and those suitable for vacuum forming. Further chapters deal with stamping and simple shaping aided by heat, the use of air pressure and vacuum, mechanically applied pressure and more complicated methods involving two or more methods. Separate sections are devoted to the revolutionary development in shaping, the vacuum forming machine and to tool construction and design. The last chapter deals with special topics such as the use of acrylics in the aircraft industry.

The book is well provided with diagrams and illustrations, is very readable and should provide a valuable addition to the literature, particularly for the student or interested layman.

METALLIZING OF PLASTICS. — By H. Narcus. (New York: Reinhold Publishing Corporation. Price 44s.)

This is the sixteenth volume of a series started in 1957. These are intended to be semi-technical and addressed primarily to engineers, students and in fact to all practical people in plastics.

The book presents a practical summary of the several methods for metallizing non-conductive materials, and particularly plastics, which have been employed by the author. These include the copper film process (developed by the author), the deposition of 'electroless' nickel coating, a review of the newer moulded conductive plastics and gas plating, as well as the better known and more widely used methods such as cathode-sputtering and vacuum deposition.

Also included is a section on the characteristics and testing of metallic deposits on plastics and the final chapter is devoted to recent developments and future potential uses for metallized plastics.

Clearly written and with numerous diagrams and illustrations, the book is essentially a metallizing manual which should prove of use to the plastics, electronics and electroplating industries.

∴ Copies may be ordered through the Books Department, RUBBER JOURNAL AND INTERNATIONAL PLASTICS, Maclaren House, 131 Great Suffolk Street, London, S.E.1.

In the new Fablonite showroom, 49 Park Lane, London, W.1, is this sideboard and table set designed by Martyn Rowlands, who has just been appointed Fablon's design consultant. Mr Rowlands is chairman of the Plastic Institute's design committee

Plastics Statistics

OCTOBER EXPORTS AND IMPORTS

PLASTICS materials exports dropped still further in October to 12,862 tons, which compares with 14,056 tons for the previous month and 15,553 tons for October 1959. The value fell to £3,191,522 from £3,932,205 in 1959. These figures are given in the official Trade and Navigation accounts, which show that the biggest quantity was taken by New Zealand (774 tons), followed by Sweden (722), Denmark (651), South Africa (612) and the Netherlands (542).

Imports during the month were 6,240 tons valued at £2,026,035 compared with 4,795 tons and £1,743,467 in October 1959. USA was the major supplier with 2,325 tons followed by Western Germany (1,580 tons) and the Netherlands (449 tons). Imports for this year now stand at 76,505 tons (£24,258,204) compared with the corresponding 1959 figures 42,853 (£15,905,760).

Exports for the 10 months of this year tot up to 141,825 tons (£35,767,001); 1959 figures were 128,735 (£32,542,698).

Details of imports of plastics materials during October 1960:

	Tons	£
Alkyd solid and liquid resins, solutions, emulsions and dispersions	201	43,321
Cellulose plastics:		
Photographic (including cinematograph) film base (except acetate butyrate)	123	167,063
All other	189	157,412
Polyvinyl chloride:		
Polymers and copolymers	1,991	274,509
All other	385	152,928
All other	3,351	1,230,802
Total	6,240	2,026,035

Exports of plastics materials during October 1960:

	Tons	£
Acrylic sheet, rod, tube, film, foil and profile shapes in primary form	560	338,079
Alkyd solid and liquid resins, solutions, emulsions and dispersions	457	97,624
Aminoplastics:		
Solid and liquid resins, including solutions	751	108,642
Moulding and extrusion compounds	723	128,357
Cellulose plastics:		
Moulding and extrusion compounds	212	84,970
Sheet, rod, tube, film (excluding regenerated cellulose), foil and profile shapes in primary form	116	68,112
Phenolics and cresylics:		
Solid and liquid resins (straight and modified)	1,001	212,761
Other	536	190,677
Polystyrene	1,259	270,833
Polythene (polyethylene) sheet, rod, tube, film, foil and profile shapes in primary form	170	66,391
Polyvinyl chloride:		
Polymers and copolymers	1,006	143,862
Moulding and extrusion compounds	796	186,827
Sheet	610	244,902
Other	146	31,112
All other	3,928	950,345
Waste and scrap (including celluloid and film waste and scrap)	591	68,028
Total	12,862	3,191,522

UK exports to countries in the European Economic Community (Common Market) and the European Free Trade Association are shown below.

EXPORTS TO EEC

	Oct. 1959	Oct. 1960
Western Germany	455	356
Netherlands	508	542
Belgium	609	491
France	410	415
Italy	434	389
	2,416	2,193

Exports to Commonwealth countries during the month were 3,566 tons (4,923 in October 1959) and exports to all other foreign countries were 4,558 tons (5,373 tons).

EXPORTS TO EFTA

	Oct. 1959	Oct. 1960
Sweden	862	722
Norway	485	329
Denmark	605	651
Switzerland	323	520
Portugal	323	323
Austria	223	—
	2,821	2,545

(Any apparent discrepancies are due to rounding off of figures)

COMPANIES in the NEWS

Outlook for Du Pont

Du Pont expects record 1960 sales of around $2,160m. against the former 1959 peak of $2,114m., but total earnings are placed at between $8.20 and $8.45 per share against $8.92 last year, according to the company treasurer, R. Russel Pippin.

Mr Pippin said that what was happening to Du Pont this year illustrated the profits squeeze encompassing most major chemical companies. Its origin principally was overcapacity, in turn leading to price cutting in many products. Rising costs and increased imports of some products were added factors. The company had been running at between 75 and 80% of productive capacity — several points less than in 1959.

The treasurer indicated that the profits squeeze had in no way prompted Du Pont to curtail spending for research and development or construction of new plants. Construction in 1960, he said, would come to $210m.-$220m. with similar plans ahead for 1961.

London Rubber

E. M. Jackson, chairman of London Rubber, reports continued group progress in the six months to September 30 1960. Both volume and value of the parent's sales were appreciably higher than for the similar period of last year.

The interim dividend has been raised from 10% to 15% to bring about a better balance between it and the final — this does not necessarily indicate any increase in the total over the 1959-60 rate of 30%.

PI Awards

The Council of the Plastics Institute has awarded a Fellowship to F. B. Makin. Associateships go to: F. E. Bassford; A. J. Brown; A. G. Eades; M. H. Elson; G. W. Gilby; G. R. Sothern; R. E. Trickett; E. Weatherstone; and A. Kennaway. Graduateships to: W. Adams; S. H. Coulson; J. A. Cousans; A. S. Green; R. E. Hackwell; W. H. Hogg; E. R. Mitchell; G. K. Payne; A. Rutherford; I. L. Smith and G. F. Yates.

New appointments have been announced by Marchon Products Ltd. and Solway Chemicals Ltd. Professor G. H. J. Daysh, who is Sub-Rector of King's College, Newcastle, holds the Chair of Geography in the University of Durham, has been appointed to the Board of Solway Chemicals. Mr A. Lindsay, chief engineer of Marchon and Solway, has relinquished his seat on the board of the latter and has been appointed to the board of the former company. Mr A. Koebner, B.Sc., D.Phil., chief chemist of Marchon, has been appointed to the board of that company as Research Director.

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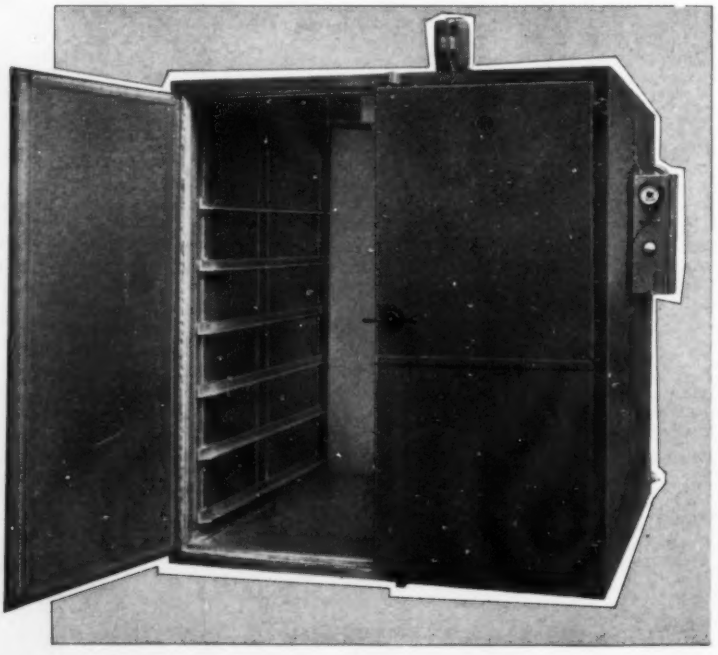

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PATENT SPECIFICATIONS

The following information is prepared from published Patent Specifications by permission of the Controller of H.M. Stationery Office. The full Specifications can be obtained from the Patent Office, 25 Southampton Buildings, W.C.2, at 3s. 6d. per copy (including postage).

Polythene Compositions

No. 851,686. Union Carbide Corporation. Application and Filed, June 3 1959. Application in USA, June 16 1958. Published, October 19 1960.

A polythene composition comprises 20 to 80 parts of polythene and correspondingly 80 to 20 parts of a copolymer of ethylene and a lower alkyl acrylate containing at least 2% of the lower alkyl acrylate. Ethyl acrylate is the preferred acrylate and particularly suitable copolymers are those containing 3 to 15% of combined ethyl acrylate.

Compared with polythene, the polythene compositions of the invention are much more resistant to stress cracking. They have a lower minimum gloss temperature and greater resistance to delaminating. Data are given for these properties showing the improvement effected by the addition of the copolymer to polythene.

Bonding Polythene to Other Materials

No. 849,021. Western Electric Co. Inc. Application and Filed, December 31 1957. Application in USA, December 31 1956. Published, September 21 1960.

Polythene and analogous organic polymers are bonded to natural or synthetic rubber or to metal by means of a bonding agent comprising partially hydrogenated polybutadiene. Sulphur or other vulcanizing agent must be present to effect vulcanization of the bonding agent. In bonding polythene to rubber, a layer of the bonding agent is interposed between the polythene and the unvulcanized rubber containing a vulcanizing agent and bonding is effected by application of heat and pressure to vulcanize the rubber and the bonding agent. In this case, it is unnecessary to add a vulcanizing agent to the partially hydrogenated polybutadiene as the vulcanizing agent present in the rubber will effect vulcanization of the bonding agent at the interface with the rubber. However, in bonding polythene to metal, a vulcanizing agent must be incorporated in the partially hydrogenated polybutadiene.

Examples are given of vulcanizable compositions of natural rubber, SBR, neoprene, nitrile rubber, butyl rubber and polybutadiene which can be bonded to polythene by means of partially hydrogenated polybutadiene. Reference is made to the use of the process for bonding polythene to (a) bare electric wires and (b) electric wires with a covering of rubber.

Spicers Netlon Conference

A conference of all the European licensees for Netlon, was held in London recently to coincide with the Fresh Food Packaging Exhibition. It was held under the auspices of Plastics Textile Accessories Ltd., and Spicers (Export) Ltd. Spicers hold the selling rights of Netlon, a thermoplastic mesh, integrally extruded in tubular form by a special process. It can be made in flexible or semi-rigid form, from polythene (both high and low density), plasticized PVC and polypropylene, and can be used either as a tube or in the flat. A wide range of colours is available.

Osborn's New Division

G. H. Osborn Building Products Ltd. has set up a new division for the manufacture of industrial reinforced plastics products. It will be based at Hayes, Middlesex; a technical service department has also been formed.

A special dough moulding compound section is already operational, and is catering for the electrical and engineering industries.

POLYMER LIAISON

A programme of important conferences on polymers and related subjects has been agreed by the programme liaison committee of the Institution of the Rubber Industry, the Oil and Colour Chemists' Association, the Plastics Institute, and the Plastics and Polymer Group of the Society of Chemical Industry.

The period covered is 1961 and some dates in 1962 and 1963. 1961 meetings scheduled are (in London unless otherwise stated): January 10-11, 'Physics of Polymers,' at Bristol University (Physical Society); February 16, Swinburne award address by Professor G. Gee (PI); March 1, 'Rubber and Plastics in Cables' (Joint IRI/PI); March 6-9, Thirteenth Technical Exhibition (OCCA); May 5, 'Cellular Polymers' (Joint London sections IRI/PI); May 30-June 3, biennial conference at Torquay on 'Physics in Surface Coatings' (OCCA); June 2, Foundation Lecture in Birmingham (IRI); June 19-20, 'Education and Training in the Plastics Industry' (PI); July 18-21, International Symposium on 'Inorganic Polymers' at Nottingham University (Chemical Society); July 27-August 1, International Symposium on 'Macromolecular Chemistry' at Montreal (IUPAC); and October 31-November 1, conference on 'Engineering with Plastics' (PI);

Charles Lennig and Co. (GB) Ltd., subsidiary of Rohm and Haas, Philadelphia, have appointed Gordon Mercer technical representative. He will handle technical and sales aspects of Oroglas acrylic moulding powder and Implex high impact modified acrylic.

IRI LEICESTER CELEBRATE

Pictured at the sixth annual dinner dance of the Institution of the Rubber Industry, Leicester Section (*left to right*) **: Mrs M. B. P. Carpenter, Mr C. H. Birkitt (vice-president of the Institution), Mrs W. H. Swire, Mr W. H. Swire (chairman, Leicester Section), Mrs J. Devlin.** (*Leicester Mercury photograph*)

Rubber Markets

LONDON

Prices again moved downwards in sympathy with Singapore in a very quiet market. Business was mostly of a covering nature. A rally, following a partial recovery in the East, was not supported by any weight of orders. Nearby rubber was offered at a discount from current shipments and the 'spot' position was still a shade cheaper than forward delivery.

Latest prices are as follows:
No. 1 RSS Spot: 25d.-25¼d.

Settlement House:
January 25d.-25¼d.
February 25¼d.-25½d.
March 25¼d.-25½d.
January/March 25¼d.-25½d.
April/June 25¼d.-25½d.
July/September 25¼d.-25½d.
October/December 25¼d.-25½d.
January/March (1961) 25¼d.-25½d.

No. 1 RSS cif basis ports:
December 24⅞d.-25⅛d.
January 25d.-25¼d.
February 25d.-25¼d.

Godown:
December 84⅜ Straits cents nominal.

LATEX

Centrifuged 60% latex per gallon in drums, seller, December, January, 14s. 3d., cif European ports. Spot, seller, 14s. 10d. London. Bulk, seller, d.w. 14s. 3d. nominal. Creamed, seller, 14s. nominal, December, January. Normal, seller, December, January, 12s. 7d.

AMSTERDAM

The Amsterdam rubber market ruled as under on December 5:

	Guilders per kilo	
No. 1 RMA	Dec. 5	Previous
December	2.44	2.43
January	2.44	2.43
February	2.44	2.43
March	2.44	2.43
January/March ..	2.44	2.43
April	2.44	2.43

Sales: Nil. Tone: Quiet.

BANGKOK

No. 1 RSS

The price of No. 1 RSS at Bangkok on December 5 was 26.87½ US cents per lb.

DJAKARTA

Prices did not change much on December 5. Sheets advanced a half rupiah per kilo. About 20 tons of sheet No. 1 were transacted today at 30 to 30.50 rupiahs per kilo for ready delivery.

	Rupiahs per kilo	
	Dec. 5	Previous
Spot No. 1 priok ..	29.50b	29.00b
Spot No. 2 priok ..	28.50b	28.00b
Spot No. 3 priok ..	26.50b	26.00b
No. 1 fine pale crepe, spot	29.00b	29.00b

Tone: Steady, quiet.

SINGAPORE

The market was inactive throughout the morning of December 5 with very minor fluctuations. Interest in lower sheets was small and selective. Quiet conditions prevailed throughout the afternoon with limited interest in lower grades. After hours, the market closed quiet.

	Malayan cents per lb. fob Malayan ports to open ports	
	Dec. 5	Previous Close
No. 1 RSS, Dec...	84¼—84½	83¼—83⅜
Jan. ..	84⅜—85	83⅞—84
No. 2 RSS, Dec...	83⅛—84¼	82⅜—83¼
No. 3 RSS, Dec...	82 —83	81¼—82
No. 4 RSS, Dec...	79 —80	78 —79
No. 5 RSS, Dec...	73¼—74¼	72½—73½
No. 1 RSS, Spot..	83⅞—84⅜	82¾—83⅜
No. 3 blanket, thick remilled crepe, Dec.	72 —73	71½—72½
No. 1 fine pale crepe, Dec. ..	90 —91	88 —89
2X thin brown crepe, Dec. ..	69½—70½	69 —69½

Tone: Quiet.

The Industries Syndicate quote latex, native produce, 60% centrifugal, packed in rectangular drums, fob at 165.20d. per gallon.

NEW YORK

The New York rubber market ruled as under on December 5:

DEALERS' PRICES

	US cents per lb., ex-dock	
	Dec. 5	Previous
No. 1 RSS, Dec.	28¼b–28⅜a	28⅜b–28⅝a
Jan.	28¼b–28⅜a	28⅜b–28⅝a
No. 2 RSS, Dec.	28¼b–28¼a	28¼b–28⅜a
Jan.	28¼b–28¼a	28¼b–28⅜a
No. 3 RSS, Dec.	28¼b–28⅜a	28b –28¼a
Jan.	28¼b–28⅜a	28b –28¼a
No. 1 RSS, Spot	28⅜b–28⅝a	28⅜b–28⅝a
No. 3 amber blanket crepe, Feb.	24⅝n	24½n

FUTURES—REX CONTRACT

	Dec. 5	Prev. Close
Jan. ..	28.65b–28.80a	28.50b–28.68a
March ..	28.75b–28.80a	28.65b–28.70a
May ..	28.75b–28.80a	28.65t
July ..	28.75b–28.80a	28.71t
Sept. ..	28.75b–28.80a	28.63b–28.65a
Nov. ..	28.60b–28.80a	28.50b–28.60a
Jan. ..	28.60b–28.80a	28.50b–28.63a

Sales: 5. Tone: Quiet.

Rubber futures were steady in quiet dealings on December 5. Physical rubber was steady and featureless with interest light.

CEYLON

No. 1 RSS

The price of No. 1 RSS at Colombo on December 5 was 95 (93) Ceylon cents per lb.

CYCLONE HOPPER COATED

A Newton Abbot firm has recently had the cylone chimney and hopper of its china clay pulverizing and drying machine lined in corrosive-resistant PVC paste by the Guildford firm Plastic Coating Ltd. Dehydrated particles of clay are forced into the chimney by a blast of hot air, and collect there before being released into the hopper for packing. Besides the corrosive effect of sulphur trioxide fumes, the chimney has to withstand attack by clay particles — any erosion of the unprotected chimney would contaminate the clay with metal particles.

Vylastic paste, based on Geon PVC has been used to give a coating with good corrosive- and abrasion-resistant properties, and good adherence to the substrate metal. At the same time it has cut costs, as both internal and external surfaces are coated, the firm expects to avoid the need for lagging the chimney.

Training Cyclists

A Dunlop film, 'Mend that Puncture,' produced by Marcus Cooper, is being used to train young cyclists in the national cycling proficiency scheme, which is sponsored by the Government and administered by the Royal Society for the Prevention of Accidents.

The national scheme was introduced in 1958 and is being developed to train 300,000 young cyclists a year. The film has been made to help maintain the high standard of training and testing of young cyclists. Produced in 16mm Ektachrome, it is obtainable on loan from the Dunlop Film Library.

Stockpile Sales

United Kingdom

Sales from the Board of Trade's stock of natural rubber in November totalled 800 tons for delivery: spot, 20 tons; December, 150 tons; January, 405 tons; February, 225 tons. Rubber still for sale totalled 28,685 tons.

USA

Sales of crude rubber from the US national stockpile in November totalled 1,525 long tons. This brought cumulative sales since October 1959 to 97,759 tons.

A two-year campaign called 'Sweden Comes to Britain — 1961-62' will start operating in January. 450 firms, including plastics manufacturers will be taking part.

Industry INTELLIGENCE

Technical Data

Polysar Krynol 653

A recent addition to the Polymer Corporation range, Polysar Krynol 653 is a low viscosity, oil-extended cold rubber similar to 651 except that it is easier processing, produces smoother extrusions and its compounds have lower viscosity. Because of this it is practical to dry mix the polymer with fine particle size carbon blacks, such as the ISAF or SAF types, without preliminary breakdown. With relatively low loadings of these blacks, vulcanizates with low hardness and good stress-strain properties are obtained which are particularly suitable for soft ride tyres. These tyres also have excellent resistance to abrasion and flex cracking.

Data on tests carried out on rubber compounds of this type are presented in Polysar technical report No. 9:9B obtainable in this country from Polymer (UK) Ltd., Walbrook House, Walbrook, London, E.C.4.

Butyl Rubber Properties

Butyl rubber has proved to be a versatile general purpose rubber and has also found uses as an insulant for high and low voltage wire and cable and for electrical components in meters and transformers. Technical Information Sheet B-39 from Esso Petroleum Co. Ltd., Chemicals Department, 50 Stratton Street, London, W.1, gives a summary of the electrical, physical, chemical and heat resistant properties of butyl rubber. The data given were obtained from a number of sources and represent average figures which one can expect using mineral filled or carbon black loaded vulcanizates. Physical constants derived for butyl and the closely related polyisobutylene polymer are also listed.

I.C.I. Silicones

A booklet recently issued by the Nobel Division of Imperial Chemical Industries Ltd. is called I.C.I. Silicones, Properties and Products. This gives a brief description of the structure and properties of silicones and lists the wide range of silicone oils, resins, rubbers and other miscellaneous products available from the division.

Details are also given of the numerous applications of these materials made possibly by their well-known properties, such as flexibility over a wide temperature range, heat resistance, good electrical properties, and water repellency. Each of the products is described in a separate product data sheet available from Silicones Department, Stevenston, Ayrshire, Scotland.

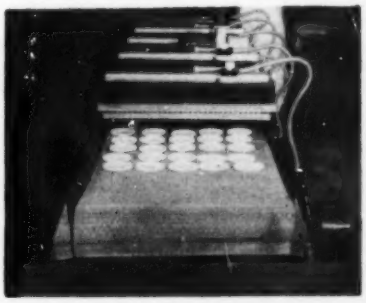
Polysar Krynac 805

The properties and applications of Polysar Krynac 805 are given in Technical Report No. 9:10A issued by Polymer (UK) Ltd., Walbrook House, Walbrook, London, E.C.4. This is a copolymer of butadiene and acrylonitrile similar to 801 NS and is recommended for applications requiring maximum oil-resistance in easy processing compounds, or for compounds where only low plasticizer loadings can be tolerated. The report gives a comparison between 801 NS and 805 and presents eight application recipes for the latter including stocks for printing plates and rolls, hose tube, roll covers, gaskets, oil resistant pads and moulded components.

Machines, Materials and Equipment

Infra-Red Dryer

A range of infra-red drying units is available from George Vokes (Infra-Red) Ltd., High Road, London, N.11. The model illustrated is suitable for drying flat or mainly flat articles. Other models are available for shaped articles



and where a shorter conveyor run can be used. The machine supplies heat from five projector units each containing three elements and power consumption of the largest machine is 21kW. The articles are carried beneath these on a 13ft. conveyor the speed of which can be adjusted to give a drying time of from 15 seconds to four minutes. The machine is available in five widths of conveyor from 18in. to 48in. and temperatures from 60°C. to 400°C. can be obtained.

Fire Alarms

Dewhurst and Partner Ltd. of Hounslow, manufacture a range of emergency pushbutton units which comply with the Ministry of Labour's recent order concerning the installation of fire alarms in factories.

Enclosed in a cast iron box with plain glass insert the normally open (make) contacts are of high quality brass, while the normally closed (break) contacts are silver tipped. A hammer is provided with each unit and is attached to the case by a short length of chain. The unit is finished in pillar box red with raised white lettering. There are four models in the range.

Publications

Regal 600

Regal is the name given to a family of oil blacks developed by Godfrey L. Cabot Inc. Regal 600 (*RJIP* April 2 1960, 523) which is produced at the Stanlow, Cheshire, plant of Cabot Carbon Ltd., is an oil furnace black with average particle size and surface area close to those of an ISAF black.

A booklet issued by Cabot Carbon Ltd., 62 Brompton Road, London, S.W.3, gives formulations and properties of loaded natural and SBR compounds comparing Regal 600 and Vulcan 6 ISAF black.

Glycerine Applications

Glycerine News, issued by the UK Glycerine Producers Association Ltd., 5 Bridewell Place, E.C.4, describes new applications of glycerine listed in patent specifications and from other published sources. Issue No. 24 November 1960 includes details on two new antistatic preparations used on Terylene and polyamide fibres, other textile finishing processes and glycerine as a plasticizer in regenerated cellulose foils. Glycerine is also used in the Wallerstein process for the manufacture of dihydroxyacetone for which considerable potential exists in many fields including redox polymerizations and textile applications.

Also listed are three patents for improved alkyd resins for corrosion and growth resistant coatings.

Six GRP Techniques

Six basic techniques used in reinforced plastics to mould thousands of products from pleasure boats to heat-resistant nose cones for missiles are explained in a 10-page letter-sized booklet just published by the reinforced plastics division of the US Society of the Plastics Industry, 250 Park Avenue, New York 17.

Intended as a convenient data guide for design engineers, purchasing agents, manufacturers and others interested in reinforced plastic moulding, the booklet describes each technique and lists its specific advantages and applications. Also given are physical and chemical properties of parts made by each method.

The moulding methods described are hand lay-up, spray-up, matched metal die preform, premix, filament winding and pre-preg.

Future Events

Institution of the Rubber Industry

London Section.—Dec. 13 at the Royal Society of Tropical Medicine and Hygiene, Manson House, 26 Portland Place, London, W.1, at 5.30 p.m. 'Some Radiation Effects on Rubbers' by E. E. Gunn (Atomic Weapons Research Est., Aldermaston).

Scottish Section.—Dec. 13 at North British Hotel, Princes Street, Edinburgh, at 7.30 p.m. 'Rigid PVC Piping' by E. J. Hoskin (British Geon). A joint meeting with the PI.

Southern Section.—Dec. 14 at the Polygon Hotel, Southampton, at 7.30 p.m. 'Modern Compounding of Neoprene,' by A. Fiber, A.I.R.I., (Du Pont (UK)).

West of England Section.—Dec. 14 at Grange Barn, Grange Street, at 8 p.m. Film 'Moulded Footwear' to be followed by Open Discussion on 'Moulded Footwear Paper,' by C. E. Webb, B.Sc., A.R.I.C., A.I.R.I. (Larkhill Rubber Co.).

Plastics Institute

North-Eastern Section.—Dec. 14 at the Eldon Grill, Grey Street, Newcastle-upon-Tyne, at 7 p.m. Film Evening.

Scottish Section.—Dec. 13 at North British Hotel, Edinburgh, at 7.30 p.m. 'Rigid PVC Piping' by E. J. Hoskin (British Geon). A joint meeting with Scottish Section IRI.

Yorkshire Section.—Dec. 14 at St. Mark's House, 186 Woodside Lane, Leeds 2, at 7.15 p.m. 'Dip Coating,' by D. Sharp (Telegraph Construction and Maintenance).

Increases of Capital

East Anglia Plastics Ltd. (459,738). Temple Works, Knight Road, Strood, Kent.—Increased on February 29 1960, by £70,000 in £1 shares, beyond the registered capital of £50,000.

Parit-Bruas (Malay) Rubber Co. Ltd. (115,613). 6 High Street, Alton, Hants.—Increased on February 17 1960, by £50,000 in 2s. shares, beyond the registered capital of £50,000.

General Factors (Eastern Counties) Ltd. (401,860). Tyre dealers, etc., Hornby House, Somers Road, Wisbech, Cambs.—Increased on March 17 1960, by £5,000, in £1 ordinary shares, beyond the registered capital of £1,000.

Alltyres (Birmingham) Ltd. (358,353). India rubber manufacturers, etc., 328 Bradford Street, Birmingham.—Increased on March 23 1960, by £2,000, in £1 ordinary shares, beyond the registered capital of £3,000.

Malaya General Co. Ltd. (98,381). Acquire estate for growth of rubber, etc., Orient House, New Broad Street, E.C.2.—Increased on March 24 1960, by £150,000, in 2s. ordinary shares, beyond the registered capital of £500,000.

Latest Wills

Mr Wilfred Ernest Redfern, of Princes Gate, 47 South Promenade, St. Annes-on-Sea, Lancs, founder in 1900 of Redfern's Rubber Works Ltd., of Hyde, Cheshire, with a capital of £4 18s. 1d., which firm grew to be worth over £500,000, died on July 26 last, aged 87 years, leaving £88,635 gross, £87,312 net value.

Mr Eric Henry Champendale, of 73 The Woodlands, Beulah Hill, S.E.19, formerly of Dumbarton Court, Brixton Hill, S.W.2, company representative of Pirelli Ltd., who died on June 19 last, left £3,353 gross, £3,287 net value.

Mr Francis Campbell Marples, of Wales House, Queen Camel, Somerset, retired rubber planter, who died on August 1 last, left £125,783 gross, £125,645 net value.

TRADE MARKS

Objections to the registration of any of the undermentioned applications may be lodged with the Comptroller-General of Patents, Designs and Trade Marks at the Patent Office, 25 Southampton Buildings, Chancery Lane, London, W.C.2, within one month of the date mentioned. The objections must be stated on Trade Marks Form No. 7, cost £2, obtainable through any money order office. The extracts—from 'The Trade Marks Journal'—given below are reproduced by permission of the Controller of H.M. Stationery Office.

ADEMCO (803,429) Foils, films and sheets, all made of flexible plastics and included in Class 17. Ademco Ltd., 26 Stamford Street, London, S.E.1. (Class 17; November 9 1960.)

CRAYLON (804,848) All goods included in Class 17. Greenwich Plastics Ltd., Willington Quay, Wallsend-on-Tyne, Northumberland. (Class 17; November 9 1960.)

FABLOVAC (806,052) All goods included in Class 17. Commercial Plastics Ltd., Willington Quay, Wallsend-on-Tyne, Northumberland. (Class 17; November 9 1960.)

CONTENDER (806,248) Non-metallic hose pipes. The Goodyear Tire and Rubber Company, 1144 East Market Street, Akron, State of Ohio, United States of America. Address for service is c/o Marks and Clerk, 57 and 58 Lincoln's Inn Fields, London, W.C.2. (Class 17; November 9 1960.)

TOOTAL (796,151) Articles included in Class 20, made wholly or principally of plastics, but not including tables or chairs or any goods of the same description as tables or chairs. Thermo Plastics Ltd., Luton Road Works, Dunstable, Bedfordshire. (Class 20; November 9 1960.)

CONTITIPS (796,476) Boots, shoes, soles, sole tips, heels and heel tips, all made of india rubber or rubber substitutes. Continental Gummi-Werke AG., Vahrenwalder Strasse 100, Hanover, Germany. Address for service is c/o Pollak, Mercer and Tench, Audrey House, Ely Place, London, E.C.1. (Class 25; November 9 1960.)

PURATHANE (806,159) Foamed plastics for use as fillings for upholstery, mattresses and motor car seating. Harrison and Jones Ltd., Purax Mills, Vauxhall Road, Liverpool, 5. (Class 17; November 16 1960).

VICLAN (808,091) Plastics in the form of sheets, foils, films, rods, tubes, blocks, strips and shaped sections, all included in Class 17. Imperial Chemical Industries Ltd., Imperial Chemical House, Millbank, London, S.W.1. To be associated with No. 808,090. (Class 17; November 16 1960).

PATENT LIST

Printed copies of the Specifications in the following list, published by permission of the Controller of H.M. Stationery Office, can be obtained from the Patent Office, 25 Southampton Buildings, Chancery Lane, London, W.C.2, price 3s. 6d., including postage.

COMPLETE SPECIFICATIONS ACCEPTED

Open to public inspection on August 31 1960

Dow Chemical Co. Foamed polyurethanes. 846,821.

Institut Francais du Petrole, des Carburants et Lubrifiants. Method of producing conjugated diolefines. 846,847.

E. I. du Pont de Nemours & Co. Production of monovinylacetylene. 846,234.

Goodyear Tire & Rubber Co. Polymerization of vinyl alkyl ethers. 846,690.

Petrochemicals Ltd. Polymeric materials comprising low pressure polyolefines. 846,684.

Union Carbide Corporation. Stabilized polypropylene. 846,695.

Open to public inspection on November 2 1960

Farbwerke Hoechst. Process for the polymerization of olefines. 853,309.

Imperial Chemical Industries Ltd. Dimerization of olefines. 853,187.

Farbwerke Hoechst. Process for the manufacture of unsaturated polyesters and copolymers thereof. 852,886.

Bergwerksgesellschaft Hibernia A.G. Method for the purification of polyolefines, prepared according to the method of ziegler. 853,294.

Wacker-Chemie G.m.b.H. Vulcanizable silicone rubber stock. 852,820.

Dunlop Rubber Co. Ltd. Coated fabric. 853,186.

Institut Für Textiltechnologie Der Chemiefasern. Production of melt spun shaped products from synthetic linear high polymers. 853,062.

Du Pont. Process and apparatus for the production of an intermittent flow of plastic material. 853,141.

Monsanto Chemical Co. Process for the suspension polymerization of vinylidene aromatic compounds. 853,318.

Montecatini. Catalysts for the production of linear high-molecular-weight polymers of alpha-olefins and process for the polymerization of alpha-olefins with these catalysts. 852,956.

Du Pont. Polymerization of propylene. 853,127.

S. J. Popell. Method of manufacturing flat plastic moulded shapes. 852,743.

I.C.I. Heavy Organic Chemicals Division has done much pioneer work in the bulk transportation of these products, for instance, by the use of special-purpose tankers, such as the m.t. 'Signe Tholstrup,' owned by A/S Kosangas of Copenhagen, here seen leaving Teesport with a cargo of butadiene, used in synthetic rubber production. The special storage spheres for liquefied petroleum gases such as butadiene are clearly seen

R·J·I·P·

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Applicants are asked to give full details of their technical education and experience in writing to Industrial Relations Division, Castle Mills, P.O. Box 47, Edinburgh, 3. (704)

ANCHOR Chemical Co. Ltd., Clayton, Manchester 11, have vacancy for rubber technologist, A.I.R.I. or equivalent qualification, age 25-30, for interesting customer service and development work. The position offers scope for initiative, ability to plan work and report it, and above all enthusiasm. Profit sharing and contributory pension schemes.—Apply with full particulars to Technical Director. (697)

ANCHOR Chemical Co. Ltd., Clayton, Manchester 11, have vacancy for plastics technologist, age 20-30, preferably with experience in thermoplastics, for production control and customer service. Profit sharing and contributory pension schemes.—Apply with full particulars to Technical Director. (696)

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RUBBER technologist required by the Northern Rubber Co. Ltd., Retford, Notts, for the evaluation of and development work on new polymers. Previous experience in the handling of synthetic polymers an advantage. Pension scheme.—Write giving full details of experience and salary required to the Technical Director. (684)

SENIOR chemist required by Redferns Rubber Works Ltd. Suitable applicant should be a graduate aged 30/35 and will understudy the present Chief Chemist, who will retire in 1965. The salary will be appropriate to the position.—Applications to the Works Director, Redfern Rubber Works Ltd., Hyde, Cheshire. (693)

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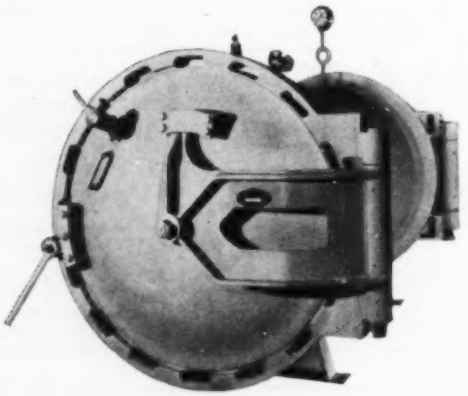

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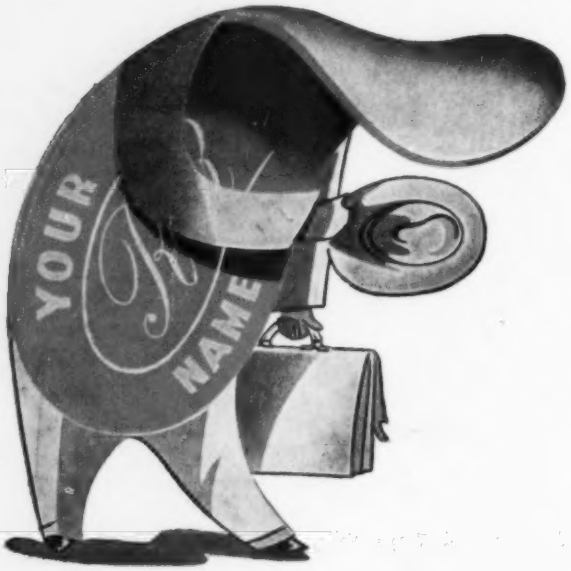

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